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Original Contributions.

ENDARTERITIS OBLITERANS AND ARTERIAL HYPERTROPHY IN THE ALVEOLAR PROCESS.

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Endarteritis obliterans and hypertrophy of the middle and outer coats of arteries are a physiologic process concerned in the disappearance of blood vessels functional in the fetal state but losing such function after birth. Like all physiologic processes of a fetal type it becomes pathologic under the ordinary conditions of post-natal life. For these reasons it again becomes physiologic in the involutional periods like the climacteric and senility. In transitory structures the process is therefore continually trembling between physiologic and pathologic. Undue excitation of the structure brings on an intensity of the process which tends to become pathologic. As I demonstrated nearly half a decade ago, endarteritis obliterans and hypertrophy of the middle and outer coats of arteries play a large part in interstitial gingivitis or so-called pyorrhea alveolaris.

The pathogeny of this process was first discussed at length in 1876, yet but little has been contributed to the subject since. For this reason I have collated the literature which is herewith given before my own experience.

Cornil and Ranvier found the small vessels embedded in inflamed tissues shared in their inflammation and endarteritis. Obliteration of the lumen was a frequent occurrence in these conditions. In their opinion, obliteration of vessels in tuberculosis was effected by pressure on the vessel, causing slowing of the blood stream and ultimately thrombosis, the thrombus later becoming organized. (Manual d'Histologie Pathologique, 1869-73, page 555.)

Heubner, who in 1874 described in detail occurrence of primary disease of the cerebral arteries, maintains that affection commences in

the intima and is essentially a gummatous growth starting thence. The endarterital growth undergoes incomplete organization, imitating the structure of the normal arterial coats and being to some extent differentiated into an intima composed of embryonic connective tissue and a muscularis formed of large spindle-cells running transversely, the two layers being divided by a brightly refracting line of elastic tissue, representing the elastic lamina. The newly-formed imperfect elastic layer can be easily seen in many specimens in which the growth has become fairly organized. (Die Luetische Erkrankung der Hirnarterien, Leipzig, 1874.)

Friedlander in 1876 called attention to an affection of the arteries of which little previously was known which he termed arteritis obliterans. It was characterized by the development of cellular connective tissue within the intima of the medium and smaller arteries

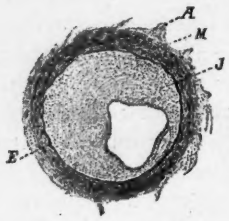


Fig. 1. A—Adventitia. E—Elastic Tissue Between Middle Coat and Intima. M—Muscular. J—Thickened Intima.

which leads to contraction and obliteration. The process begins with a proliferation of closely compressed round cells between the innermost elastic lamella and the endothelium. The cells enlarge, an intercellular substance develops, and the tissue appears to have the character of the granular tissue as also of the mucous tissue, although without mucin reaction; new vessels likewise often form little arteries with abundant circular fibres of the ciliary muscle. The proliferation makes its appearance either circumscribed or concentric around the vessel periphery, whereby either partial or local contraction and obliteration take place. The newly developed tissue retains for a long time the appearance of the granulation tissue, or passes into a dense sclerotic connective tissue, or becomes caseous; fatty or calcareous degeneration, as in atheromatous process, is the exception. Under these conditions the remaining elements of the wall of a

vessel undergo manifold changes. Arteritis obliterans seldom occurs primarily. Under physiologic conditions it causes occlusion of the ductus arteriosus of the umbilical artery and of the arteries and veins of the uterus post partum. As a secondary process, on the contrary, it has a wide range.

Heubner's syphilitic disease of the cerebral vessels belongs to this category and has no specific syphilitic character as Heubner believed. It occurs in meningitis, neoplasms, abscess processes, tuber-

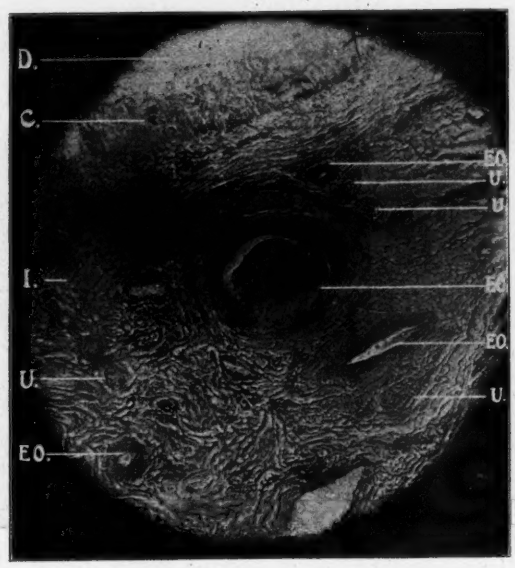


Fig. 2. Cross-Section of Peridental Membrane, Showing Endarteritis Obliterans. Scurvy in Man. C—Cementum. D—Dentin. I—Peridental Membrane. U—Nerve Tissue. EO—Endarteritis Obliterans.

culosis of the lungs, lobular and interstitial pneumonia, inflammations of the small bronchi and of the lactal ducts in cancer of the mammary glands and in all chronic inflammation. The pathologic changes of the arterial surrounding set forth in the wall of the vessel and produce arteritis. By experiments on animals affected with tubercular diseases and in lung affections by cutting through the un. laryngei inferiores the changes have been plainly recognized

after forty hours. The cellular element has probably three origins—either it is a production of the endothelium of the vessels, or it is from white blood corpuscles that originate in the arterial blood, penetrating between the endothelium or from the vaso vasorum. The last named plays, in Friedlander's opinion, the principal role. Corresponding to the proliferation of the intima accumulations of

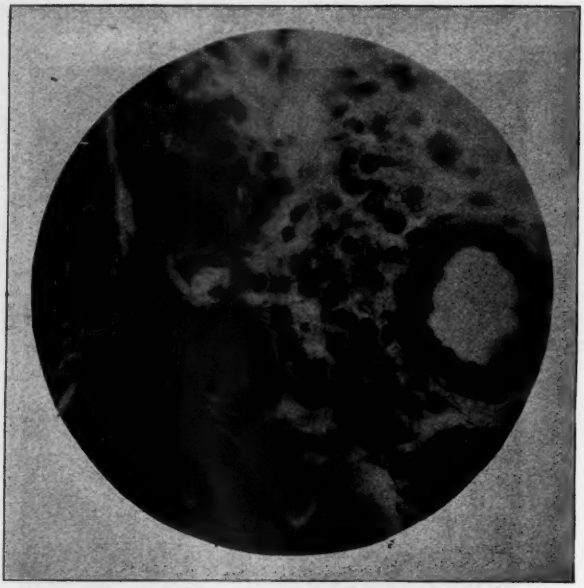


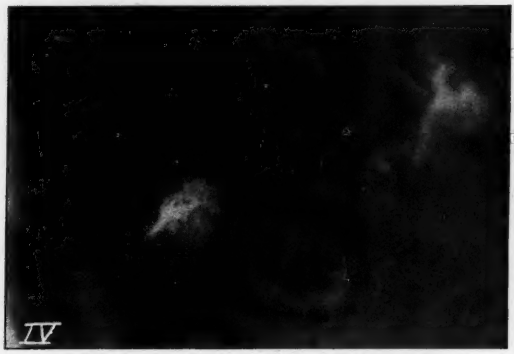
Fig. 3. Longitudinal Section of Gingival Border, Higher Magnification, Showing Round-Cell Inflammation Extending to the Inner Coat of the Blood Vessel, and also Plasma—Mast Cells.

cells were always found in the adventitia. (Cent. f. d. Med. Wissen, Berlin, 1876, vol. 14, page 65.)

Zeissl (Wien Med. Blätter, 1879, vol. 11, page 562) reported a case of obliteration of the left brachial artery caused by leutic endarteritis in a thirty-seven-year-old male who had acute articular rheumatism, and ten years previously syphilis which twelve weekly treatments were supposed to have cured. For two years a tumor gradually developed in the upper part of the left arm. For two

months the tumor caused severe pain, strength and flesh lessened, and the tumor appeared cooler than the rest of the arm. The patient was anemic, the radial pulse weak. After treatment for fifteen weeks the tumor diminished to a very slight swelling. The artery was completely obliterated and later collateral circulation established itself. After five months the swelling entirely disappeared.

W. B. Hadden reports the case of a thirty-five-year-old woman who six months previous to consultation had severe pain in right arm shooting down the hand. Four months later the tips of the first and second fingers became hard and cracked. She was healthy, well nourished and had no visceral disease. She complained of constant



pain, occasionally shooting into the thumb and first and second fingers of right hand. The fingers were pale and cold and on the tips were flat irregular warts. The thumb was pale, cold and stiff, the tips hard and thick. There was no pulsation in the radial and ulnar arteries, but it existed in the arteries at the bend of the elbow. Tenderness was present along the whole brachial. The skin over the ends of the thumb and the first three fingers became gangrenous and sloughed. According to Hadden the prolonged pressure on the arteries was the exciting cause. (Tr. Clin. Soc. London, 1884, vol. 17, page 105.)

According to Hippolyte Martin the internal tunics of most of the small arteries are subject during practically man's whole life to irritating influences which inflame and thicken them and consecu-

tively diminish blood in the circulation. Progressive obliterating endarteritis begins in infancy and is localized then, especially in nutritive vessels of the first portion of the aorta; hence the minute atheromatous patches on its surface. Later it invades numerous small arteries, but is localized particularly in the circulatory and active functional organs. Progressive diminution in carrying nutrition destined for viscera entails simultaneously atrophy of functional elements and proportionate development of connective tissue. This sclerosis starts practically from an affected arterial trunk, where nutrition is most markedly insufficient, it is not preceded by capillary lesion on this surface. The functional cellules in the vicinity of its origin appear healthy and are not inflamed during the initial period and until sclerotic tissue has perceptibly developed. These according to Martin do not result from inflammatory irritation, hence he has designated the condition dystrophic sclerosis. Progressive endarteritis may occur in acute form, especially in infectious diseases (diphtheria, typhoid fever), and then entails rapid circulatory disturbances which may cause death, when the organ affected has a function as important as that of the heart. Irritant elements circulating in the blood, especially of certain individuals (alcoholic, saturnine, gouty, etc.), exaggerate and hasten evolution of chronic progressive endarteritis. From a histologic point of view, proliferation often starts in the terminal artery itself, and there remains localized or extends beyond it. Sometimes, however, it predominates beyond the internal elastic bandelet, separating same, and in these cases the morbid processes should be seized from the first phases in order to comprehend the point of departure, the localization and evolution. (Revue de Medicine, 1881, vol. 1, page 32.)

Robert Saundby, discussing endarteritis and the inflammatory changes in the coats of the small vessels, agrees with Friedlander, Baumgarten and others that this affection is a non-specific endarteritis, the sequel to gummatous infiltration of the adventitia. It is not claimed by either side that the endarterital lesion presents any characteristics by which its specific nature can be positively identified, and the whole dispute therefore turns on the seat of the initial lesion. Saundby asserts he never saw a case of arterial syphilis in which there was not marked infiltration of the adventitia and never knew of a case in which this had not been present. (Journal of Anatomy, 1882-83, vol. 17, page 180.)

Alfred Will describes gangrene on both upper extremities following endarteritis obliterans in a fifty-two-year-old man, who after a railroad accident from which he sustained great shock lost strength gradually. One day he noticed the sudden development of gangrene on the middle finger of the left hand; later an abscess the size of a walnut appeared on the medial side of the left upper arm; then the middle finger of the right hand was observed to discolor, and there was much pain in the arm and hand. Patient died five weeks after

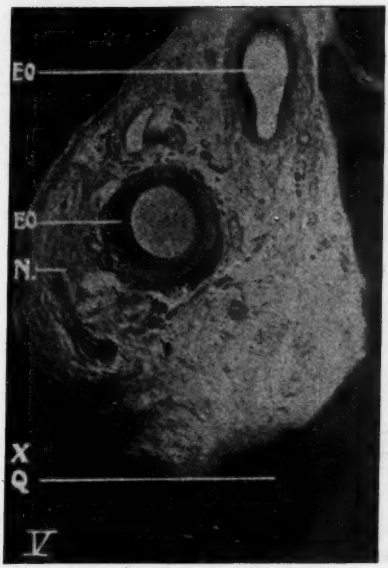
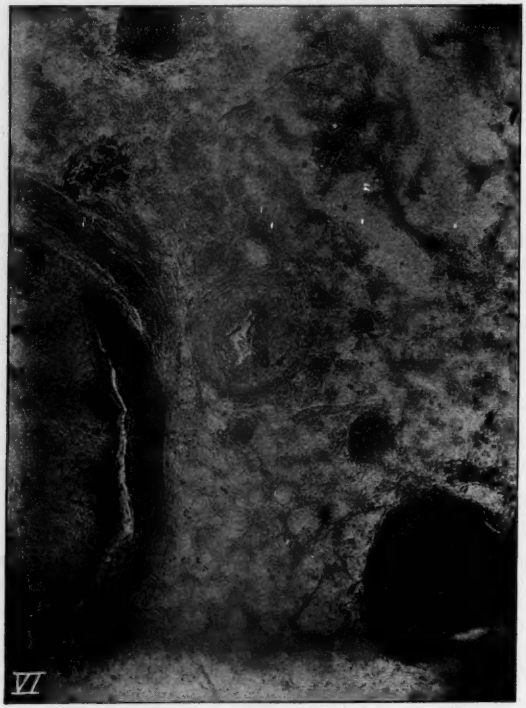


Fig. 5. Transverse Section of Alveolar Process, Chronic Inflammation Extending throughout. Dog. N—Large space Arising from Absorption of the Alveolar Process starting in the Haversian Canals. EO—Endarteritis Obliterans..

the gangrene had developed on both arms, and the autopsy led to the diagnosis of endarteritis. (Berlin Klin. Wochen., 1886, vol. 23, page 268.)

Hatch describes obliterative endarteritis in a male aged sixteen whose right little toe became blackened, ulcerated and dropped off. He attributed this to exposure to damp while working in rice fields.

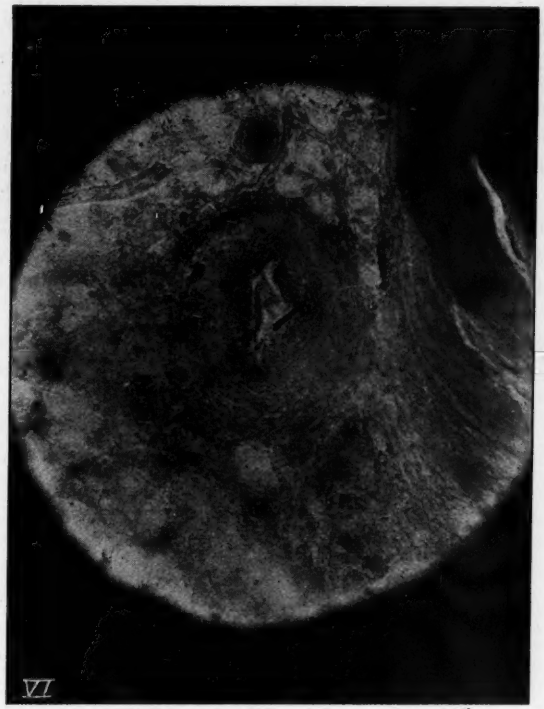
Subsequently the other bones of that foot became similarly affected and separated from the metatarsal bones. There was no history of any previous disease. Operation was followed by tetanus, transfusion and death. Hatch remarks that under the low state of vitality induced by insufficient nourishment, obliterative arteritis fol-



lowed by dry gangrene is not uncommon among the poor of Bombay. (Lancet, vol. II, 1895, page 16.)

Pearce Gould relates a case of spreading and obliterative arteritis in a nineteen-year-old man with no family or personal history or evidence of syphilis, and the following symptoms. The right hand and forearm were colder than the left and somewhat wasted. When the hand was warm he could wash with it, but it quickly became cold and painful, and was always worse at night. The brachial

artery was harder than the left and less affected by the pulse, which ceased in it just above the elbow joint. The radial artery was felt as a prominent hard pulseless cord. There was no pulse in the ulnar artery, and all other arteries appeared normal. There was a small patch of dry gangrene on each of the first, third and fourth digits. Temperature and urine were normal. Gould lays the most stress



on the small amount of gangrene that resulted from so extensive an obliteration of the main arteries of the part. This case resembles Raynaud's disease.

Mahomed observed a case of obliterative arteritis which terminated fatally. The patient, a man, suffered from attacks of pain down one arm, accompanied by angina pectoris. Thrill and *bruit* were distinguished in the subclavian artery and aneurism was suggested

as a cause. Necropsy revealed the arteritis. (British Medical Journal, 1884, vol. 1, page 317.)

George L. Peabody in 1886, reporting four cases of endarteritis obliterans to the New York Practitioner's Society, said: "It is interesting that death may result from this lesion with striking clinical evidences of destruction of motor areas in the brain, which autopsy reveals to be intact."

In addition to the partial obliteration of the lumen of the nutrient artery of the area affected there must be spasmodic contraction of the vessel or vessels, sufficient to cause complete local arrest of the circulation. This contraction varies; it may last a few minutes or may be prolonged until death ensues. Another possible termination is hemorrhage. This is frequently found in nearly all the organs of the body. Peabody observed it in the lungs, kidneys, heart and in neoplasms, especially in epitheliomata, and more particularly in the brain. Peabody does not believe that it is due to syphilis, as held by Steinberg, Heubner, Wilks and others. His four cases are as follows:

Case I. An Irish tailor, aged fifty-six, denied syphilis, temperate habits, suffered for six months from continuous headache and ringing in the ears. Ten days previously he fell to the floor unable to move either right extremity, speechless but conscious. Half an hour later he was able to talk and power returned to the leg but less to the arm. He had several attacks of similar character since the first one mentioned. Could not speak or move but generally recovered in a few minutes. He was senile, superficial arteries stiffened and tortuous, poorly nourished, and had incomplete right facial paralysis, well-marked right hemiparesis, lateral curvature of the spine, chest barrel-shaped, heart sounds normal. Death ten days later. Post-mortem showed pathologic changes in the Circle of Willis, showing insignificant patches of atheroma. Microscopic examination of the arteries exhibited the lesions to be chronic endarteritis. A connective tissue growth from the intima involved to a varying degree almost the entire circumference of the vessel.

Case II. Stenographer, aged thirty-six, for several weeks prior to illness complained of vague and indefinite pains in the occipital region and of sharp lancinating pains on right side of head. After working steadily all day and evening he retired about eleven, and at one o'clock next morning his wife became aroused by loud stertor-

ous breathing. She failed to rouse him to consciousness, and he was wildly delirious, endeavoring to force his way through the wall. Later he became profoundly comatose. From this condition he was never again aroused. When loudly spoken to and shaken his face would become distorted as if in pain and he would bring his right hand to his head and groan. Urine suppressed for twenty-four hours and then fairly abundant and of normal characteristics. Marked cutaneous hyperesthesia but never any paralysis. Death forty-five hours after commencement of attack. The patient believed himself

syphilitic, but attending physician was never satisfied that he was. Microscopic examination of the basilar artery at the site of the lesion revealed combined the evidence of well-marked periarteritis and endarteritis obliterans. The wall of the basilar artery was very thick, owing to a growth from the intima.

Case III. Woman, aged eighty, history of sudden unconsciousness continuing for a week. Complete paralysis of the left arm, incomplete paralysis of left leg. The extremities of right side were rigid, automatic movements of right hand and arm, imperceptible pulse. Death followed twenty-six hours later. Autopsy showed

the cortex of the brain to be in condition of senile atrophy, the vessels at the base of the brain and the two middle cerebral arteries extending well into the fissures of Sylvius, showing condition of obliterating arteritis.

Case IV. Watchman, aged forty-five, suddenly attacked with convulsions, more marked on right side. Sufferer from rheumatism, headache, dyspnea on excretion, poorly nourished. Superficial arteries rigid and tortuous, rigidity and occasionally convulsive movements of left extremities, slight right facial paralysis. Arcus senilis was marked, complete amnesic aphasia. After two weeks he left the hospital apparently well. The course of his disease precluded syphilitic pachymeningitis.

Weinwarter found in a foot, amputated by Billroth because of spontaneous gangrene, a peculiar endarteritis and endophlebitis, which greatly differed from atheroma. Through a proliferation of the intima the lumina were partly obliterated, partly constricted. Weinwarter found no vein wholly obliterated. In his opinion exposure to cold and moist clothing extending over a period of years may eventually provoke a chronic process of proliferation in the vessels, since his patient on account of susceptible frost bite frequently bathed the parts with snow. (Arch. f. Klin. Chir., Bd. 23, page 202.)

W. J. Walsham describes acute obliterative endarteritis in a man aged fifty-two. There was no history of syphilis or alcoholism and no cause could be assigned. The right arm was affected. The disease spread from below upward (while the patient was under observation) reaching as high as an inch below the clavicle. Furthermore there was the same indurated, tender and pulseless condition of the radial, ulnar, brachial and lower portion of the axillary arteries as the sub-clavicle artery formed an aneurysmoid swelling the size of a hen's egg. The hand and forearm were cold and tips of fingers cold and bloodless. There was intense pain in hand and forearm, and the disease after lasting about four months subsided spontaneously. Walsham believes that the disease depends upon nerve lesion. (Lancet, 1888, vol. 1, page 571.)

Walter Pye reports a case of obliterative arteries in a man who had to use a crutch since eight years of age. There was loss of sensation in the fingers, and ultimately the artery from the axilla downwards solidified. Circulation returned to some slight extent. In discus-

sion of the case Hadden said it resembled a class of cases in which plastic effusion into the arteries gives rise to thrombosis. (Lancet, 1888, vol. I, page 699.)

Bertram W. Bond reports obliterative arteritis in a boy aged fourteen who had an attack of "shingles" on the left side of the chest and back. No pulse could be felt in the upper extremity of the left subclavian. Here the beat was synchronous with that of the right subclavian but much feebler. The pulse in the right radial was normal and no undue thickening of arterial walls could be felt. The radial

and brachial arteries felt as cord-like bodies. The boy complained of the "pins and needles" sensation. His collateral circulation was good. Beyond slight blueness of the fingers there was no visible sign of deficient nutrition, and there was no history of rheumatism or congenital syphilis. (Lancet, 1895, vol. I, page 150.)

Dutil and Lamy report a case of endarteritis obliterans similar to that of Friedlander. They state that the affection is precocious, is seen principally in the male, makes its appearance independent of atheroma, with no syphilitic or alcoholic diathesis. The small arteries of the nerves are inflamed, even obliterated, corresponding degenerative neuritis ensues, having a proportionate development

to the vascular lesion. To these two groups of alterations important phenomena are attached. One is the intermittent claudication and painful sense of helplessness which develops during walking but ceases quickly with absolute rest, and the other is an ensemble of gangrenous alterations where neuritis and vascular obliterations intervene at the same time. (Archives de Med. exp. vol. 5, page 1, 1893.)

Borchard reports six cases of primary endarteritis obliterans that occurred in the surgical clinic of Konigsberg. They came under observation as cases of spontaneous gangrene of the lower and upper extremities, and on account of the relative youth of the patients and the peculiarly slow progress particular observation was made which resulted in the above diagnosis. In all six cases there was a more or less complete obliteration of the arteries by an obturative mass which consisted of glistening connective tissue and spindle-shaped or oval endothelium-like cells. The latter are not uniform, but are divided into closely compressed groups. The numerous vessels are especially rich in cells. The walls consist usually of a layer of endothelium, singular, circularly-arranged muscular layers. To this are added in somewhat rarer cases a more or less strong adventitia and in the intima one or more distinct elastic membranes. In the open vascular layers fresh red-blood corpuscles can be recognized. Abundant old and young blood pigment is found in the middle and then on the edge. Next to singular, thin-walled newly-formed vessels, traces of hemorrhage can be recognized at a remote distance. On the outside this innermost peculiarly obturate mass is surrounded by a homogeneous layer with few cells which follows every sinus and fold of the winding and extraordinarily glistening elastica. Occasionally more than four layers of these elastic fibers may be recognized, all of which course parallel with the peculiar membrane. (Deut. Zeitschr. f. Chir., 1896, vol. 44, page 131. Illustrations.)

Hoegerstedt and Nemser in an elaborate article upon the constriction and closure of large arteries give an account of three cases. Syphilis appears to have been the principal etiologic factor, in others arterio-sclerosis with or without syphilis and strain. In these cases a number of large arteries of the trunk and limbs have been constricted and even gradually occluded and converted into fibrous cords. It began with thickening of the arterial wall in the form of

arterio-sclerosis or as a syphilitic endarteritis, and it terminated in thrombosis and occlusion. The symptoms varied according to the arteries affected and the rapidity of the process of occlusion; where it was gradual the collateral circulation was established and there was no functional defect. (Zeit. f. Klin. Med., 1896-97, vol. 31, page 130.)

Thoma does not agree with Friedlander that there is a special form of obliterative endarteritis, neither is he of the opinion of Billroth and Weinwarter that gangrene in both old and young subjects is due to this condition. He believes that the above authors have mistaken for it a thrombus replaced by connective tissue occurring

in an artery affected with arterio-sclerosis. (Text-book of General Pathology, vol. 1, trans. by Dr. A. Bruse, 1896.)

Walter G. Spencer says with regard to the occurrence of arteritis obliterans in the arteries of the limbs, the term is not here used as synonymous with obstruction such as may occur from embolism, thrombosis, atheroma or calcareous arterio-sclerosis. It is also clearly distinguished from gangrene following Raynaud's symptoms. Confining attention to arteritis obliterans proper, we have the cases described by Weinwarter and by Widemann occurring in old patients in which there was undoubted thickening of the intima, yet owing to the age of the patients and their other complications one may doubt whether the cases were not allied to more familiar forms of arterial disease. Spencer's case—male, aged twenty-seven, mother and two brothers died of phthisis and a sister was subject to it. The

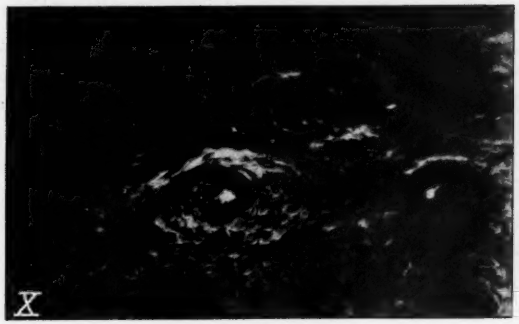
patient's left foot was cold at times and he had to rub it to get it warm. A sore formed on the toe, healed, and broke down again. Three weeks prior to admission to hospital left foot changed color to bluish red and a dark spot formed on the great toe. At night the left foot became painful across the base of the toes, pain over the upper course of the anterior tibial artery on the left leg and foot, dusky red patch of gangrene would not disappear on finger pressure. No pulsation could be felt in the left leg. A cord occupied the line of the femoral artery. The right leg and foot were also cold, but had good color excepting for the blue black patches which did not disappear on pressure, no pulsation. No pulsation over the abdominal aorta and iliacs. The right arm was colder than the left. Subclavical, axillary and brachial arteries were smaller on the left side. The radial pulse was of low tension. (Clin. Soc. Trans., 1897-98, vol. 31, page 89.)

Allbutt (System of Medicine, 1899, vol. 7, p. 301) says that obliterative endarteritis was first described by Friedlander in 1876, that it is often accompanied by neuritis, and before complete obliteration intermittent claudation of the arteries of the limb may occur, associated with cyanosis and coldness of the extremities, thus giving rise to a condition resembling Raynaud's disease. The disease is more frequent in men than in women, and affects adults between thirty and sixty. Causes unknown; not associated with any particular diathesis, nor with any acquired disease such as syphilis, alcoholism, malaria, albuminuria or diabetes. Microscopic examination reveals thickening of the walls of the arteries due to cellular proliferation of the endarterium and hypertrophy of the middle and external coats, development of the vaso vasorum in the middle and external coats, and inflammatory thickening of the small vessels which may have led to complete occlusion. The obliteration of the lumen of the artery may be due to thrombosis or proliferating endarteritis. The coats of the veins may be thickened but these vessels are not blocked. The muscles of the limbs may degenerate while the nerves remain unaffected.

Any artery of the body is liable to become involved but more particularly in those of the extremities. While puberty may produce a severe attack, the condition is more frequently noticed later in life—the later the more pronounced. Men are more subject to the disease than women. Coldness of the limbs, hard whip-cord arteries

with no pulsation, and gangrene of the extremities result. The disease begins in the intima and extends to the other coats of the artery. It may be found in all local inflammations of long standing, especially in the extremities, and may occur in conditions of vaso-motor ataxia such as are present in Raynaud's disease and allied conditions. Syphilis, tuberculosis, typhoid fever, scurvy, and the condition underlying arterio-capillary fibrotic kidney lesions act at times as predisposing causes. Toxins and autotoxic products of retained waste may disturb physiologic balance, thus giving the pathologic phase this disorder sway. If the disease is more frequent in men than in women, it is because women eliminate much more freely than men, and because they are not often subjected to drug poisons.

Endarteritis is an inflammation of the intima or internal coat of the



arteries and capillaries, generally of a chronic type. Other coats of the arteries may become involved in which there is also a thickening. Its pathogeny is as follows: In direct contact with the blood streams is the endothelium (a layer of flattened cells); next is the tunica intima, composed of elastic fibers arranged longitudinally; next comes the middle coat, composed of muscular fibers arranged transversely. The outer coat consists of longitudinal connective tissue, which contains the vaso vasorum. In the capillaries the intima lies in immediate contact with the surrounding tissues, or is accompanied by a rudimentary adventitia. In other words, the walls of the capillaries consist of almost nothing but the intima. The capillaries have certain contractility; they contract or dilate without muscular fibers. The veins probably also have a cer-

tain amount of contraction and dilation from irritability of the intima. Each coat of the arteries takes on a special type of inflammation. The causes of endarteritis are numerous. Inflammation of the intima of the blood vessels may be due to irritation from without or within.

When it occurs from without any local irritation will set up an inflammation which may extend to the outer coats of the capillaries. This produces a marked increase of blood. The vaso vasorum becomes swollen, the white blood corpuscles crowd into the terminal capillaries and migrate into the extravascular space. Rapid proliferation of the round-cell elements takes place. The walls of the vessels become thickened. Owing to the projecting intervals of the intima the caliber of the blood vessels diminishes. Fig. 1.

Irritation occurring from within results either from trophic changes in the system from direct irritation from toxemias or from both interdependently. Under these circumstances a germ disease or other toxins may have an affinity for a certain organ, tissue or part and produce irritation in the capillaries in a distinct part of the body, or the capillaries through the entire body may become involved. Thus in typhoid fever Peyer's glands in the intestine become involved; in scarlet fever, the skin or kidney; in malaria, the liver and spleen; in Bright's disease, the kidney; while in mercurial and lead poisoning and scurvy the mucous membrane and especially the gums become diseased. In many of these conditions, however, before the tissue already irritated becomes involved the nervous system may already have become affected from other causes, such as locomotor ataxia, traumatic injuries to the spine, paretic dementia, cerebral paralysis, neuroticism and degeneracy, and last but not least, stomach neurasthenia. The poison in the blood, together with the diseased peripheral nerves, produces irritation and inflammation of the inner coat of the capillaries. If this irritation does not disappear soon after its inception the inflammation tends to affect the other coats of the blood vessels. Under certain conditions, however, endarteritis may never involve the other coats of the vessels. When irritation of the inner coat of the capillaries takes place proliferation of the endothelium occurs. This inflammatory growth tends to obstruct the lumen of the vessel. The media may likewise become thickened by an increased connective tissue. The capillaries become obstructed and finally obliterated, which eventually impedes the circulation. Fig. 2 shows such a condition in a case of scurvy.

Irritation may be of less intensity but greater duration, as in syphilis, tuberculosis, scurvy, mercurialism, plumbism, etc., and the results are then slowly effected. Proliferation of subendothelial connective tissue gradually increases until it reaches its limit (endarteritis obliterans). This influence of the proliferation is exerted in addition to that of the round-cell infiltration about the structure.

The recent studies of Hektoen (American System of the Practice of Medicine, page 119) on meningeal tuberculosis demonstrate that tubercle bacilli may penetrate the unbroken endothelial layers of the vessel and stimulate proliferation of the subendothelial connective tissue. An internal irritant, such as may be produced in the course of any infectious disease or from suboxidation, probably acts upon the endothelium of the walls of the smaller blood vessels in such a way as to permit the escape through the walls first of serum, and then of leucocytes, the latter infecting and surrounding the vessels. The effect of the chronic endarteritis is to check the blood supply to the gum tissue. Mercury, lead and other poisons circulating through the blood are forced to remain, hence the discoloration of tissue along the gum margin. Interstitial gingivitis, resulting in a slow disturbance of nutrition, produces overgrowth of connective tissue. In all cases of chronic interstitial gingivitis, as shown in the illustration, are the blood vessels thus involved.

Among the predisposing influences which cause this disease are syphilis, tuberculosis, mercurialism, plumbism, brass poisoning, lithemia, nephritis, gout, rheumatism, alcoholism, scurvy, nervous diseases, pregnancy and old age. Under certain conditions of the system any and all diseases which tend to lower the vitality, producing anemia, will assist in producing this disease. The direct cause may be resultant overstrain of the blood vessels.

Owing to obliteration of the arteries in the alveolar process stasis of blood must follow. The detritus from the alveolar process must therefore remain in the tissue and collect upon the roots of the teeth.

What concerns the dentist more than anything else (and to which I have often called attention) is the fact that the alveolar process is a transitory structure and is hence susceptible to atrophy and disease. This is due to the fact that the structure is an end organ. The nerves and blood vessels approach a blank wall. The root of the tooth is virtually a foreign substance. The blood vessels and nerves concerned are also approximately end organs. My investigations

have been made upon human and animal alveolar processes which have suffered from almost every disease in which these tissues could become involved.

Endarteritis obliterans and hypertrophy of the blood-vessel walls in the alveolar process are always observed in connection with both local and constitutional causes.

On administration of drugs, especially mercury or lead, to healthy young dogs, inflammation of the alveolar process with diseased arterial walls is seen at the end of a month or six weeks. Fig. 3 shows the commencement of the thickening of the intima in a dog. The coats of the arteries are well defined, and the inflammatory process has just begun. Examination of the alveolar process of animals or human beings suffering from disease in which the eliminating organs are not throwing off effete matter, especially in syphilitic, tuberculous and scorbutic patients, easily reveals this morbid state.

Fig. 4 is a poor illustration of the disease in pregnancy. If such patients are degenerates the process will be exaggerated.

Fig. 5 illustrates endarteritis obliterans in the artery of a dog with interstitial gingivitis.

Fig. 6 is from the alveolar process of a tuberculous monkey.

Fig. 7 illustrates the closing of three arteries from mercurial poisoning.

Fig. 8 shows endarteritis obliterans with arterial-coat hypertrophy in interstitial gingivitis from lead poisoning.

Fig. 9 shows hypertrophy and endarteritis obliterans in interstitial gingivitis from diabetes mellitus.

Fig. 10 illustrates hypertrophy of three arteries in a syphilitic.

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CONTROLLING HEMORRHAGE OF THE ORAL CAVITY.

BY H. E. BELDEN, M.D. READ BEFORE THE SECTION ON STOMATOLOGY, AMERICAN MEDICAL ASSOCIATION, MAY, 1903.

The pathology of the hemorrhagic diathesis is not perfectly understood, and its actual cause cannot always be satisfactorily explained. It is quite evident that the bleeding continues from a lack of harmony between the coagulation of the blood and the contractility of the

vessels. There is a tube invented by Wright, by which the coagulation time of the blood can be determined. The blood is sucked into the tube and its fluidity tested at intervals of less than a minute.

The normal time for blood coagulation is from two to four minutes, but in the hemorrhagic diathesis and in certain diseases the time is so extended that a clot does not form quickly enough to engage the fibrin and act as a plug in the mouth of the vessels, but on the contrary, coagulating in from six to twenty minutes, the clot, forming outside, acts as a vehicle to hold the wounded surfaces apart and facilitates the free oozing of the blood. Therefore hemorrhage continues from a perverted relation between the constituents of the blood which are necessary to form a clot (fibrin ferment, fibrinogen, and paraglobulin) and the contractility of the circular muscular fibers of the arteries, veins, and capillaries.

We know that the vasomotor system of nerves not only acts on the entire vascular system as a whole, but can control the blood to a circumscribed locality. So in the wounds caused by leeches, bleeding continues for hours after the removal of the leech. Could this not be explained by the fact that the leech has produced a circumscribed vasomotor paralysis?

I think that an important point in the arrest of hemorrhage is that the doctor impress the mind of the patient with his ability to control the hemorrhage, thus overcoming the effect that fear has on the vasomotor centers, as they control the contractility of the muscular coat of the vessels. I have noticed, after the extraction of teeth, that fear has a tendency to increase the hemorrhage. For example, Miss T. came into my office the other day to have a tooth extracted. She is not of the hemorrhagic diathesis, but presented a marked case of surgical fright. After the extraction she bled profusely.

Dr. J. A. Bodine in a recent clinical lecture cites a number of cases where death has been caused by fright. He says that the autopsy findings are exactly the same in cases of death from fright as in those from chloroform poisoning, the cause of death in both cases being a vasomotor paralysis, "that is to say, the nervous system lost control over the motor nerve leading to the blood vessels, and especially the veins of the body, and as a consequence the patient bled to death into his own tissue."

The simple term hemorrhage is used when the blood passes outside

the body. If it escapes *within* the cavities of the body it is known as *internal* hemorrhage. When a small quantity of blood is forced or infiltrated into the tissues extravasation is produced. Internal hemorrhage may occur in two different ways—by rupture of the vessels, and by diapedesis. In diapedesis the corpuscles of the blood escape into the tissues through the walls of the vessels.

The control of hemorrhage depends upon its cause. The cause may be accidental, that is, come from injury or disease, or it may be intentional, as in operations or the extracting of teeth. The hemorrhage may be arterial, venous, or capillary, but is often a combination. When there is injury to the arteries or large veins, ligature is necessary, and when to the smaller veins and capillaries, we resort to sutures, compression, and styptics.

After the extraction of teeth prolonged bleeding might occur from the dental artery becoming entangled in the ragged edges of the alveolus and its mouth being held open. In this case the bleeding would be red blood and spurt in jets. A drill run down into the cavity would disentangle the artery and stop the bleeding. In the same way it is possible that a nerve might become entangled. This would cause neuralgia. Relief would respond to the same treatment.

With proper treatment, death is seldom a result of hemorrhage of the oral cavity. When it does occur it generally comes from the hemorrhagic diathesis or from accidental puncture to the larger vessels, as the jugular vein and carotid artery, or, in cases of cancer and other malignant growths, to capillary bleeding from the slough of unhealthy granulations. When the hemorrhage occurs from this cause the general condition of the patient is so serious that death is imminent anyway.

The treatment of hemorrhage of the oral cavity may be classed under three heads—mechanical, medicinal, and physiological. The mechanical methods consist of direct application, as plugging or tamponing, compression, ligating of the artery, tortion and suturing, position of the patient, etc. As hemorrhage of the oral cavity is usually capillary, compression is often all that is necessary to control it, when properly applied.

In this connection, I will tell of the heroic treatment resorted to with good results by Dr. Fry of Hebron, Neb., of which I lately read in the DENTAL DIGEST. Tooth extraction was followed by hemorrhage in a patient subject to bleeding. He took an impression

of the mouth in modeling compound; when cold, he trimmed it to make an appliance that could be worn in the mouth, notching it to receive a strong bandage to be tied over the head. He then made a thin batter of plaster, added a pinch of salt, and filled the appliance, putting it at once into the mouth and pressing it into place. When the plaster was set he added the bandage and tied it firmly. The socket had previously been packed with fluid extract of ergot. Immediate relief was given.

In cases where a predisposition to hemorrhage is known or suspected it is well to give systemic treatment before operating, the treatment depending upon the general condition of the patient. Among the new remedies which have appeared is calcium chlorid. The *Medical Brief* has this to say of it: "Calcium chlorid, in doses of from eight to sixteen grains every two to four hours, should be tried in all forms of persistent hemorrhage. This salt increases the coagulability of the blood, but if used more than three days consecutively it has the opposite effect." In a recent number of the *Cosmos* is the following, taken from the *Revue de Stomatlogie:* "USE OF CALCIUM CHLORID TO PREVENT HEMORRHAGE AFTER TOOTH EXTRACTION.—As is well known, the extraction of a tooth may give rise to severe hemorrhage in persons suffering from hemophilia. Dr. C. E. Vallis of London has observed the case of a woman, aged twenty-five years, presenting the hemorrhagic diathesis, in whom the extraction of a tooth was followed by a hemorrhage which lasted thirty-six hours. As the teeth of this patient were in very bad condition, and as extraction of all the carious teeth became necessary because of dyspeptic troubles from which the patient was suffering, Dr. Vallis endeavored to use some means by which the coagulability of the blood would be increased. With that object in view he administered calcium chlorid in weak doses during a period of eight days previous to the time set for the performance of the operation. He extracted an incisor without the slightest loss of blood. Continuing to administer the same agent, he was able to extract every tooth without hemorrhage. Since then Dr. Vallis has observed a similar case in which calcium chlorid has given the same satisfactory results. The disagreeable taste of this medicament, and the slight tendency to constipation which it induces, are the only inconveniences connected with its administration, even after a continuous use during a period of three to four weeks."

The *Medical Journal* gives the following formula ascribed to Bertignon:

Crystalized calcium chlorid.....	4 grams	60 grains.
Syrup of mint.....	30 grams	1 ounce.
Distilled water	90 grams	3 ounces.

To be taken in the twenty-four hours, a tablespoonful every two hours.

Dr. A. J. Ochsner gives a method of treatment in cases of hemophilia, which consists of giving albumin in the form of whites of eggs. He says, "When from four to six whites of eggs are given three times daily there seems to be a very definite effect exerted upon the clotting properties of the blood of these persons."

Another remedy which increases the coagulability of the blood and is creating general attention as a hemostatic is *gelatin.* It should be given in large doses, from one hundred to three hundred grains daily, and can be continued indefinitely. It seems to be contraindicated only in Bright's disease. It is doubtful whether it should be used subcutaneously or intravenously, as cases of tetanus have been reported from its use. We can understand this, for we know that gelatin is the medium used for propagating bacteria; and several authorities give it as their opinion that sterilization destroys its hemostatic properties. When applied locally an antiseptic should always be used in conjunction with it. It is a splendid systemic remedy, and the good results consequent upon its use are probably due to the nourishment of the vasomotor centres.

The following I have taken from the *New York Medical Journal,* copied from the *Progrès Médical:* "M. Marc Laffont and M. André Lombard conclude that whenever some nutritional vice modifies the cryoscopic and other properties of the blood there may be a glycosuria, an albuminuria, or a hemorrhage. Whether this syndrome is accompanied or not by an anatomical lesion, in a great majority of instances the lesion is curable if one attacks the cause. Gelatin seems to be the only agent capable of rendering the plasticity of the blood normal, when administered in the dose of two hundred and twenty-five grains daily. It is a harmless drug and no contraindication to its use exists, and its administration should be prolonged."

The *Philadelphia Medical Journal* has this to say of adrenalin: "Generally speaking, adrenalin when locally applied is the most

powerful astringent and hemostatic known; also a very strong stimulant of the heart. It is non-irritating, non-poisonous, and non-cumulative so far as it has been observed. It is indicated in a condition produced by morphin and opium poisoning. It has produced good results in circulatory failure, in prevention of collapse of anesthesia, and allied conditions. It is invaluable in carrying out bloodless operations in nose, ear, eye, and throat work. Out of a great number of operations in which it was used, in only a few instances was sloughing after operation reported. The length of time required to control bleeding depends upon its strength."

The following points I have culled from the report of the drug in the last number of the *International Clinics.* Adrenalin is six hundred and twenty-five times more active than the fresh suprarenal gland. The adrenalin chlorid rapidly produces ischemia of mucous surfaces, and is employed in oral surgery for performing bloodless operations. Internally in large doses it causes dyspnea, lowering of the sensibility, diminished reflexes, and loss of voluntary movements. According to Tarasmio, death takes place by the paralysis of the central nervous system in frogs, and by pulmonary edema in mammals. In rabbits 0.02 adrenalin per kilogram was always fatal when administered subcutaneously, but never by the use of 0.002 grains (grams).

I have lately been experimenting with adrenalin in a small way, and have used it with good result to arrest the gingival hemorrhage which sometimes occurs in the removal of tartar from the necks of teeth, and to check the bleeding which comes from the abrasion of the gums caused by the slipping of an instrument, sand-paper disks, emery wheels, etc., also in the removal of epulic tumors and after the extirpation of the pulp of a tooth. I have had good results consequent upon the use of adrenalin in conjunction with cocain in tooth extraction. I take a dram of the solution (1 to 1,000), add a grain of cocain (which gives about a two per cent cocain solution), and inject a few minims into the gum. The cocain produces the usual local anesthesia, and the bleeding in almost every case has been extremely slight, and in some cases there has been no bleeding at all.

Bartholow says of turpentin: "It is a serviceable cardiac stimulant when the action of the heart is weak and the arterial tension low. In passive hemorrhages we possess few agents more generally useful. The indications for its use are a general debility, relaxation of the

vessels, and an impoverished condition of the blood. It need hardly be stated that active hemorrhage or a condition of plethora contraindicates the use of turpentin."

According to Garretson, "Depressing the action of the heart is under almost all circumstances a valuable means to arrest hemorrhage. To this end veratrum virid is always given with satisfaction. The dose is five drops for an adult, given in a tablespoonful of water. Conjoined with this, and in many instances quite capable of taking its place, is the hot foot-bath."

Dr. Arthur Masur advises the use of powdered charcoal after tooth extraction where the hemorrhage requires special attention. His method is as follows: "The alveolus, which is freely irrigated with pure water, is dusted with charcoal powder, and, to insure better adaptation of the charcoal to the bleeding capillaries, it can be packed into the alveolus by means of cotton." There is also another and very easy way of carrying the powder into the alveolus —by means of a damp cotton tampon, which is made to take up the charcoal and is then introduced into the canal. The powder is allowed to remain two minutes in the alveolus, and is then washed out with a strong stream of water. In cases in which it is desirable to leave a packing overnight, the use of iodoform gauze impregnated with charcoal is recommended, although the essayist states that he has never had to recur to this procedure, as he has always been able to arrest hemorrhage in these cases with the simple application of charcoal powder. The action of the charcoal powder is supposed to be merely a physical one, the closing up of the openings in the capillaries with the charcoal granules. Incidentally, it is also stated, the charcoal has the property of hastening the healing of the wound, and its union with the tissues of the wound is very intimate, as it takes a strong stream of water to dislodge it.

Dr. Spaark advises a wash of five parts of water to one of chloroform to prevent hemorrhage after tooth extraction.

It is not necessary to consider the long list of hemostatics, as alum, ergot, tannin, etc., but I will say that I do not advise the use of styptic iron or strong solutions of nitrate of silver as hemostatics in the mouth; in fact, I decidedly object to them both, because of the danger of sloughing and secondary hemorrhage with an enlarged bleeding surface. Nitrate of silver destroys tissue and causes much inflammation to the mucous membrane, and styptic iron makes

an objectionable stain which is difficult to eradicate. For persistent hemorrhage I do recommend, when simpler remedies fail, a sharpened stick of lunar caustic applied *once* as an actual cautery to the bleeding sockets of extracted teeth.

In treating hemorrhage after tooth extraction my method is this: I have the patient rinse his mouth with an antiseptic solution. I then syringe the bleeding sockets in which the teeth were with pure peroxid of hydrogen or dioxygen, then follow with an antiseptic solution. This stops the hemorrhage, but should it recur I repeat the above, and then apply as an actual cautery a sharpened stick of lunar caustic run down carefully into the very bottom of each socket, then pack tightly with antiseptic cotton held in place with a compress. The peroxid of hydrogen or dioxygen dissolves more thoroughly the clots from the mouths of the vessels, gives oxygen to the blood, and stimulates the muscular contraction, and nature is allowed to assist itself.

When it is necessary to use an anesthetic in operating in the oral cavity chloroform should be chosen (unless contraindicated), as it is not a heart stimulant, it does not increase the blood-pressure, and so adds nothing to the liability of hemorrhage. During the anesthesia of the patient care should be taken not to allow any blood to get into the lungs by way of the trachea, or pneumonia will follow. (Necessary precautions against asphyxiation will of course be taken.) This can be prevented by the Trendelenburg position, the use of the saliva ejector, and judicious sponging with hot water or ice-water.

Of the many operations that are performed in the oral cavity for correcting congenital deformities, for hypertrophy of the gums, for affections of the tongue, the hard and soft palate, extirpation of cysts, tumors, and malignant growths, clipping the uvula, and operations on the tonsils, none is more common than the last named. The following comprehensive definition is given by Dr. Richard Faulkner: "The term 'tonsil' is now applied to various collections of lymphoid glands situated at the oropharyngeal orifice, the anal orifice, and at points throughout the alimentary tract." We have to consider only the oral tonsils. "It is now agreed that they are absorbent glands of lymphoid structure, their chief function being the generation of lymph-cells or leucocytes," which "escape through the surface epithelium of the tonsil into the free cavity of the pharynx, where they destroy microorganisms and other deleterious agents."

In operating on the tonsils there is usually considerable bleeding, as they are very vascular bodies, deriving their blood-supply from the tonsillar and palatine branches of the facial artery, the descending palatine branch of the internal maxillary, and the ascending pharyngeal. Usually the hemorrhage can be controlled. Fatalities from hemorrhage after amygdalotomy have been caused most often from hemophilia, or accidental injury to the adjoining larger vessels. Although the internal carotid is situated about three-fourths of an inch back, cases have been recorded where it has been punctured. Brocha reports a fatal case due to an anomaly on this vessel.

Some of our New Orleans fraternity will remember an operation performed here by Dr. Bemis several years ago for abscess of the tonsil. He opened the abscess with a bistoury, and the man went home. After several hours there was a gush of blood. Dr. Bemis was visiting patients and could not be found, and the man bled to death. At the post-mortem examination it was found that the abscess had disintegrated the walls of the carotid artery, and when the pressure exerted by the pus was relieved the walls of the vessel gave way.

The treatment for controlling hemorrhage after extirpation of the tonsils is ligating the larger vessels where necessary, compression, and styptics. Antipyrin is a favorite hemostatic in tonsillar surgery.

Dr. Frank Washburn says, "Anemia is no doubt a causative factor in bleeding after throat operations, as may also be incomplete removal of the adenoids, the wounding of the faucial pillars, reaction after cocain anesthesia, etc."

Two cases of severe hemorrhage after removal of the tonsils are quoted in the last quarterly of the *International Clinics,* one a fatal case, a hemophilic child, reported by Stewart. I will quote the article exactly for the other case. Escat reports recovery by operation in a severe case of hemorrhage after amygdalotomy where gargling with cold water, tamponing, using the galvanic cautery, ice, and hemostatics failed. Record's compressor arrested it, but the pain was so great it had to be removed. The method of Baum was then tried with success. With a needle-holder, used in staphylorrhaphy, he passed a large curved needle and silk thread through the anterior and posterior pillars of the fauces, and tied the suture. This not being sufficient, he tied another two centimeters below. The cavity left by the removal of the tonsil was closed, but the

hemorrhage continued. Gelatin was injected into the cavity without result. A cylindrical tampon of cotton roll the size of his little finger was then carried by a nasopharyngeal forceps from above the upper suture into the cavity and downward until it appeared below the lower suture. The hemorrhage was stopped at the end of twenty-four hours, sutures and tampon removed. The cotton may be previously moistened with adrenalin (1 to 5,000), hydrogen peroxid, antipyrin (ten per cent), or ferropyrin (two per cent).

PORCELAIN AS A FILLING MATERIAL, ITS QUALITIES AND MANIPULATION.

BY HENRY C. RAYMOND, D.D.S., DETROIT. READ BEFORE THE MICHIGAN DENTAL ASSOCIATION, JULY 8, 1903.

During the last five years we have read and heard much of porcelain as a filling material. In the last two years especially our journals have contained many articles on the subject, and there has hardly been a meeting of importance at which papers and clinics have not been given. In fact, I may say that the most *potent* word in the dental profession to-day is "Porcelain." It seems to occupy the first place. Everything pertaining to it is eagerly sought and read, and it forms the basis for the most interesting and lively discussions at all our dental gatherings. Seeing that so much has been said and written about it, it is not so easy to write a paper that will both interest and instruct as it would be if the field had not been so largely covered.

But though it has been so prominently before us, I believe that a large majority of the profession yet know very little about it from a practical standpoint. There are many who yet doubt its practicability as a permanent filling material, some from honest motives, others because they have not the energy to enter into a new field. There are many attempting the work, but only half succeeding from a lack of knowledge of definite methods, and there is doubtless a great number who have faith, but are hesitating on which road to start, the high-fusing or low-fusing, the impression-method of getting the matrix or the direct burnishing. Knowing this to be so, and believing as I do that in porcelain we have the best tooth preserver at our command, and a material of which every intelligent dentist should be able to successfully avail himself, I trust will enable

me to say something that will convince some who are skeptical, encourage those who need it, and help to start in by the simplest and most practicable methods those who are anxious to take it up.

Porcelain is no longer an experiment. The years of service it has given, and the manner in which it has saved and is saving teeth in which all other materials have proved a failure, indicate that it is almost if not quite an ideal restorer of lost-tooth substance. It honestly merits the high position it holds with those who are benefiting their patients by its use. Its wide range of application, its compatibility, its preservative qualities and permanency, with its wonderful harmony with tooth structure and color, are making for porcelain the position its holds to-day—a position in which it will become more firmly entrenched as time goes on. Its range of application is almost unlimited, in fact, the individual operator's ability to apply it is the only limit to its use. By the skillful operator it can be employed wherever gold or any of the plastics can be used, and it can be successfully put in many places where gold or other materials cannot be used. However strong this statement may appear, it is fully borne out by the experience of those who are skillful in its application. In the teeth of old and young it is equally to be depended upon. Especially in childhood and youth, in those frail, so-called soft teeth, that crumble away from gold or amalgam, and seem to defy all attempts at permanent salvation, porcelain may be depended upon to save them. It is the only material that will save teeth for many years by filling that would otherwise have to be crowned. The importance of this can hardly be overestimated, for however well a tooth may be crowned, it is rarely so satisfactory an operation as is a well-filled tooth, especially when it is remembered that the pulps in most crowned teeth must be devitalized and removed, which in many instances would not be necessary if restoration with porcelain were resorted to instead of crowning.

In the permanent preservation of the teeth porcelain certainly seems to stand at the head. This cannot be doubted by any who have had opportunity for observation. Those who have been doing this work a number of years, both in this country and abroad, say they do not get recurrence of decay around porcelain fillings and do not expect it. One operator, whose integrity cannot be doubted, makes the statement that during the ten years he has been using porcelain he has not once seen recurrence of decay around the in-

lays, and I can fully substantiate that by my own experience extending over a number of years. In many mouths the teeth filled with porcelain have been the only ones preserved, while other teeth in the same mouths have been filled and refilled with gold, only to result in failure. Why there is not recurrence of decay no one has yet satisfactorily explained. There are theories in plenty, and I will not take up time in more theorizing, further than to say that probably the compatibility of porcelain with tooth structure, with the cleanliness of its non-porous glazed surface, brings about that environment which exists in mouths when the teeth become immune from caries. This feature of compatibility I cannot too strongly commend; it means so much to us. It enables us to save many pulps that would otherwise have to be destroyed if metal were used as a filling. Teeth that are persistently annoying under metal fillings and sensitive to thermal changes, even in some of the shallow cavities, are almost at once rendered comfortable when porcelain is used. So marked is its compatibility that it almost seems to act as an anodyne. In large compound cavities, where sufficient anchorage cannot be obtained to insert a gold filling without encroaching on the pulp, and frequently necessitating its removal, porcelain can be used without endangering the pulp in the least. This is undoubtedly partly due to its conducting quality being almost analogous to that of the teeth, and so enabling it to meet the thermal changes much in the same manner as they do. Much more might be said along this line to show why porcelain should have so strong a claim on us, possessing as it does all those desirable qualities necessary to save the teeth.

I will pass to the feature possessed by porcelain which first attracted me toward its use, namely, its cosmetic or esthetic value, its harmony with tooth color and structure. Though this feature is a very attractive one, I think it not out of place to speak of it last, when we consider the more important qualities porcelain possesses. To imitate nature as closely as possible should always be our foremost thought. This we can do with porcelain as with nothing else. It certainly can only be the familiarity of our patients and ourselves with the use of gold that permits its employment in the anterior teeth, with its consequent unsightliness and disfigurement. Porcelain, with its beautiful possibilities in matching the teeth and rendering them pleasing to the eye, must, I am sure, appeal to all

without further commenting upon it. The saving of fatigue to both patient and operator is something that should strongly commend the use of porcelain to us. It does this in a large degree, and with nervous, frail patients and hard-worked operators you well know what an advantage it must be.

Following closely on the question, shall we use porcelain? naturally comes the much discussed point, shall it be high-fusing or low-fusing? Considering the wide difference of opinion on this point, it is not surprising that it should be a stumbling block, not only to those who are not far enough advanced in the work to judge for themselves, but also to those who have not commenced. As I am interested only in trying to place before you the manner and means by which the best results may be obtained, I do not hesitate to state that I am strongly in favor of the high-fusing porcelain, and will try and show from clinical experience why we should use it, to be the most successful from a mechanical and artistic standpoint. The principal claim made by low-fusing porcelain advocates is that it is easier to burnish a gold matrix than it is to burnish one of platinum, and that closer adaptation can be obtained with its use. It may be and probably is a little easier to burnish gold into a cavity than platinum, but excepting in the simplest cavities it is much more difficult to remove the gold matrix without changing its form than it is one of platinum. The statement made by one or two Eastern men that there are cavities into which gold can be burnished, giving perfect adaptation in all parts of the cavity, and that platinum cannot be used with the same success in such places, is untrue and entirely without foundation, for anyone skilled in the use of platinum for a matrix can get just as perfect adaptation in all parts of the cavity and at the margins as can possibly be obtained with gold. In fact, the finished inlay for the most difficult cavity made from a platinum matrix will show closer adaptation than one made from a gold matrix. This was conclusively shown at the recent meeting of the Chicago Odontographic Society, when Dr. Reeves of Chicago made inlays of high-fusing porcelain for two teeth in which cavities had been specially prepared either for or by Dr. Ottolengui of New York, who is probably one of the strongest advocates of the gold matrix and low-fusing porcelain. The result showed that not only could good adaptation be gotten from the use of platinum, but that much better adaptation could be secured than

by the use of gold, for the finished inlays made by Dr. Reeves of high-fusing porcelain were more perfect in every way than those made of the low-fusing porcelain. No doubt one reason for this is, that owing to the greater stiffness of the platinum the matrix can be removed without change in form, which is a most difficult matter to accomplish with the gold. I think the claim in favor of gold to give closer adaptation may be dismissed, for experience has proved to the contrary. But supposing that just as perfect adaptation could be secured with the gold matrix, there are disadvantages connected with its use that do not apply to platinum, which does not require the use of investment material. There is just enough stiffness in the metal to admit of free handling without changing form while the porcelain body is being built in. It is also much easier to return the work to the cavity for a guide in contour, or for a reburnishing, as is sometimes necessary. The handling of a platinum matrix simplifies the work considerably over the use of a gold one.

In speaking of the porcelain itself I will be as brief as possible, for time will not permit me to go as fully into it as I would like. The subject is a most interesting one and could well form the basis of a paper in itself. The advantages possessed by the high-fusing porcelain are enough in themselves for us to decide in its favor, even if the method of using it were more complicated than that of the low-fusing. It is not necessary to go into the question of strength, as both the high and low-fusing porcelains of the best grade are strong enough for all our requirements. The difference in shrinkage between the two is considerable, there being very much less in the high-fusing, which is a decided advantage, as fewer bakings are required and it is easier to gauge the work. This is of course most noticeable in large contour fillings. The two most important points in favor of high-fusing porcelain are its greater translucency and more life-like appearance in color and texture, though an advantage almost as important is that it will retain its form under heat, and not run and flow out of shape as the low-fusing material does. One does not run nearly so much risk of burning out the color in the high-fusing. With the low-fusing very little heat above the actual fusing point will entirely destroy the color as well as the form. High-fusing porcelain does not change color in the mouth as the low-fusing is apt to do.

When the above-mentioned advantages possessed by the high-

fusing material are taken into consideration, and when it is considered that the low-fusing porcelain has no advantage over it, I think it is evidence enough why the former should be chosen by those who desire to obtain the most satisfactory and harmonious results in their work. There is no doubt that beautiful work can be done with the low-fusing enamel by those experienced in its use, and for Dr. Jenkins, its leading exponent, I have the greatest regard and respect, for I think it is largely through his effort that the great interest in and revival of porcelain inlay work has been brought about. But though I admit this, I am satisfied that still better work can be done with the high-fusing porcelain, and believe that the technique of its manipulation is simpler and the results more definite. I have seen the work of experts in both materials, and have worked them both myself, but I have seen few inlays made of the low-fusing porcelain in which the adaptation and contour were so good as in those made of the high-fusing material. The difference between the two in translucency and life-like appearance is very marked indeed.

Having decided on using a high-fusing porcelain, we should, before selecting our material, have some knowledge of the principal qualities it should possess to give us the best results. When high-fusing porcelain is spoken of, it is understood to mean one that fuses above the melting point of gold, but it does not necessarily mean that those bodies fusing at the highest degree of heat are the best for inlay work; though it may seem that the higher the fusing point the greater the translucency. Extensive experiments have shown that for inlay work the best results are obtained with an enamel body that fuses somewhere between 2,100 degrees and 2,400 degrees Fahrenheit. You may have a high-fusing body that falls far short of what is required, and some I have used are wanting in the essential points, both in the working of the material and in the finished inlay. What we need is a body that is finely ground, so that it will pack closely, and have the minimum amount of shrinkage, a body that can be easily shaped and carved, that will stand up and keep its form and color under heat, and will not disintegrate or fill with air bubbles with repeated bakings. Further, there should exist strength and density, compatible with translucency, and the final baking should show a beautifully glazed enamel surface, entirely free from any granulated appearance or pits. Brewster's

enamel bodies come nearer filling these requirements than any I have used. I do not hesitate to mention the name of this manufacturer, for he has probably made more extensive experiments in this line than any one, and that, too, in collaboration with practitioners who were seeking the best. He has by the excellence of his product created a demand, when little existed, by giving the profession at a time when it was most needed an enamel body that has greatly simplified the work in this field.

In the making of porcelain fillings two grades of fusing material should be used, a foundation body and an enamel body. The foundation body should fuse at a degree of heat at least 200 degrees higher than the enamel body, and is used, as its name indicates, for the foundation or first baking, to insure against change in form during subsequent bakings, which would take place were only one grade of fusing material used. This would be very marked in large compound fillings where a large mass of porcelain all fusing together would by contraction draw the margins of the matrix in and spoil the adaptation. As I am going to give a clinic in this work, and can then show the cavity formation and the several steps in inlay construction, as well as the method of getting colors, better than by description alone, I will not take up your time by going minutely into details here. My method of forming the matrix, which I have described in other papers, is the same as taught by Dr. Reeves, whose system of getting colors he gave in a paper which he read at our last state meeting. (DENTAL DIGEST, April, 1903, p. 425.)

I will therefore give only the underlying principles to be followed from the formation of the cavity to the setting of the finished inlay. In shaping the cavity, cutting must be proceeded with until sound enamel and dentin are reached, always bearing in mind that there must be no undercuts. If in removal of decay undercuts have been formed they must be filled up with cement. Any device of self-locking form or retaining walls is totally unnecessary, in fact, such must be strictly guarded against, or it will be impossible to withdraw the matrix without changing its form. A decided base or seat must be made, however, to keep the inlay from rolling around and slipping out of place when being set. Shallow cavities should be cut deep enough to prevent the cement from reflecting through the porcelain. The margins must not be beveled from the outer surface, but cut

to a knife edge, made perfectly even and smooth, and polished wherever possible. There is no more important step in the work than that of having perfect margins, and it should always be kept well in mind.

In approximal cavities in anterior teeth extending to the incisal edge it is well to cut the lingual wall in excess of the labial to aid the filling in resisting the outward force exerted during mastication. A strong feature in connection with porcelain work is that in approximal spaces it is very essential to get sufficient separation before starting. This gives opportunity for perfect contact and contour, and permits the gingival margins of the gum tissue to retain their normal aspect, all of which is of vital importance for inducing cleanliness and for the comfort of the patient. I might say that sufficient space means that we must get at least as much as would be necessary to make a perfect gold filling, in some cases it means a little more. Don't be afraid of getting too much space in which to work. In approximal cavities get it by wedging; in labial and buccal cavities extending up to and beneath the gum get it by pushing the gum away with gutta-percha. If in preparing a cavity it is considered necessary to apply the rubber dam, before doing so get the color of the teeth, for after the dam has been over the teeth a short time they dry out and become several shades lighter, which is very misleading and results in an imperfect match in the inlay.

For the matrix I use platinum, one one-thousandth of an inch in thickness, and in nearly all cases burnish directly into the cavity. Some operators advocate taking an impression of the cavity and swaging the matrix on casts or dies by the water-bag method or rubber cushion. Sometimes fairly good inlays are produced by this method, but rarely is the adaptation so good as could be gotten by direct burnishing. I have discarded all such methods for general work and can see no advantage in them. They are rather a disadvantage, for it is a complicated and roundabout way of doing something that can be much better accomplished by the simpler, quicker and more accurate method of direct burnishing. Those who have tried both methods will see at once the force of this argument.

The main points to be observed in burnishing are perfect contact in all parts of the cavity, to have smooth and accurate margins, and to be sure in removing matrix from the cavity not to spring or pull it out of shape. How to accomplish this I can show better by dem-

onstration. Always use a piece of platinum as large as is practicable, for this will facilitate handling. By freely extending it over the margins you will produce the form of the tooth, which in contour work is of great assistance in building out the porcelain. In compound cavities only is it necessary to return after the first baking to be reburnished. When much tooth structure has to be restored I "try in" the partially finished inlay for guidance in contour, but the only cavities in which I reburnish are those in bicuspids and molars involving the proximo-occlusal surfaces. These are the most difficult of any cavities we meet with, and it is not an easy matter here to get an inlay that fits, owing to the shrinkage of the large mass of porcelain, which draws the margins of the matrix towards the center. To overcome this, after I have baked in the foundation body, of which I use as much as possible, always being careful not to allow it to extend to the margins, I return to the cavity and thoroughly reburnish to the margins again. Here comes the great advantage in using two grades of fusing material. I build up the rest of the inlay with the enamel body, which fuses at a much lower degree of heat than the foundation body. The temperature required to fuse the foundation body is not again reached, consequently there is no further shrinkage of that portion of the inlay, and it holds the matrix in the form into which it has been reburnished. I do not remember that this method of controlling these cases has been advocated by anyone else,but after considerable experimenting I have found it is the only way to get satisfactory results.

With the matrix ready, comes the building in of the porcelain, and it is in this part of the work, with the matching the color of the teeth, that our ability is tested in being able to discriminate between the different shades and colors to be found in the teeth. It is here that our artistic sense must be brought into play. As I said earlier, I get my colors by building up in layers. To do this successfully one must learn to find the underlying colors which exist in all teeth. They are in the dentin only and reflect through the enamel, which varies very little, being of a neutral shade. Though at first it may seem difficult to detect these underlying colors, you will be surprised how, after a little practice, you will be able to detect two or three different shades in teeth that at first sight seemed just one plain color. What looked like a simple yellow tooth will when closely

examined be found to have a gray or blue tint or both mixed in with the yellow, and to produce the natural translucent effect for which we are working these colors must appear in the inlay. This can be accomplished only by building up and baking in layers the different colors called for, and blending as required, remembering that the different shades of any one color are produced by the depth of the layers used. The thicker the layer the deeper the shade, and the reverse. For the anterior teeth in approximal cavities inlays can be made in this way, having the yellow color which generally appears at the neck of the teeth, and gradually shading down to the delicate gray or blue tint at the incisal edge, giving most natural and beautiful results, which cannot be produced in any other way. It is entirely unnecessary to mix two or more colors to get a given shade, and it is also undesirable, as the effects would be opaque and china-like. With practice any effect we desire may be produced by the building up in layers, which not only gives the most harmonious results, but also gives that much-desired translucency, and in a large measure does away with the shadow problem by breaking up the rays of light.

I can hardly leave this question of shades and colors without speaking of the use of primary colors, which are really high-fusing bodies laid on like oil paints. When we desire to carry out in the inlay a stain which is in the natural tooth, or when deeper colors or shades are required than can be got with the porcelain bodies, these paints are invaluable, as nature can be so closely imitated with them that it is almost impossible to detect their use.

After the last baking the platinum is stripped off and the reverse side of the inlay etched with hydrofluoric acid. It is now ready for the final stage of the work, the setting, and it is just here that failure will come if we are not careful and thorough. All the good work and care that has been expended up to this point may go for nothing from faulty manipulation in the setting. I am frequently asked how I get my inlays to stay in. To that I can reply only that I observe strict rules in setting them. Experience and time have proved that inlays can be retained in any position without the aid of pins baked in the porcelain or cavity extension of any kind, if there is perfect adaptation in all parts of the cavity, and they are set with the cement under pressure, taking care of course to use a reliable cement, and keeping it dry till perfect crystallization has taken place.

Whenever possible the rubber dam should be applied and the greatest care taken in the manipulation of the cement. Pressure may be obtained by the use of the wedge, ligatures, or in occlusal cavities by allowing the patient to close the teeth on the inlay with a cushion between. It takes about thirty minutes for the cement to properly set. As the cement will darken the inlay a trifle it should be a shade lighter than the tooth, though it is well to always use a cement as near the color of the tooth as we can get.

After the surplus cement is trimmed off it should not be necessary to grind and polish the margins of the inlay, as is advocated by some. If the cavity margins are properly prepared, and the requisite care is used in building the porcelain to the margins of the matrix, the inlay will fit flush and no finishing will be required. It is claimed that the enamel bodies may be ground and polished, which is true, but when it is done you have a far different surface from the glazed one as it comes from the furnace. When the surface is ground off, it does not matter how well it may be polished, you destroy one of the strongest claims made in favor of porcelain, namely, absolute cleanliness, from its glazed, non-porous surface. To satisfy yourself on this point, examine with a magnifying glass a piece of porcelain that has been ground and polished. The occlusal surface may be ground if necessary, as it will be kept clean by friction, but the grinding of all other surfaces should be avoided as much as possible.

Those who are doing this work, but have not tried the method of getting colors by building up in layers, may think it a very difficult process. They will find, however, if they thoroughly understand the principle, and faithfully work it out, that the satisfactory results obtained will more than repay them for the extra time it will at first require. To those who are not at all familiar with the work this paper may give the impression that filling teeth with porcelain is a long and complicated process. Such really is not the case, though to be a successful worker in this field one must have delicacy of manipulation, skill and patience. We do not all possess these qualifications in an equal degree, but there is not one here who could not acquire them in at least a large measure.

Before attempting to work on even the simplest cavities in the anterior teeth, I strongly advise practicing on teeth out of the mouth. Of course there will be failures in the beginning, in fact, I know of no work that is so exacting in demanding the closest attention to the

simplest details. Patience you must have. But patience and perseverance will win out, and you will be surprised how in time you will be getting pleasing results, and will soon find yourself succeeding in filling with porcelain cavities in teeth that at the beginning seemed utterly impossible.

Porcelain work is clean and beautiful, and should give us more moral tone, for we are getting nearer to nature by using it. We must observe certain laws or rules in its use which will make us more careful and raise the standard of our work generally. Then, too, I am sure that there is nothing in life that gives more genuine satisfaction than achievement, or that which is accomplished by the aid of our best efforts. Filling with gold has at times been strongly advocated by some of our most skillful operators and valued teachers, if only for the reason that its use calls for the highest skill at our command. In no less measure does porcelain work do this. It surely demands the best that is in us, and just as surely does it repay us in the beautiful results obtained. There is no work I have ever done that has given my patients and myself more genuine satisfaction than porcelain inlays.

Discussion.—*Dr. W. H. Cudworth,* Milwaukee: The essayist has so skillfully handled the subject that he has left little to be said. I can't altogether agree with his conclusions as to the relative merits of the high and the low-fusing bodies. I have no doubt he is sincere when he says that he can get much better results when using the high-fusing bodies, and can't believe that the low-fusing bodies have any claim to merit in comparison. I have used both bodies, and have reached the conclusion that with low-fusing bodies—and by this I mean the bodies fusing not lower than the Jenkins' bodies—I can get the most satisfactory results. I don't know how you are to harmonize these statements unless you conclude that we are both right, and that this question is largely one of personality. I am in accord with low-fusing porcelains and can work them successfully, while the essayist has directed his attention toward the high-fusing porcelains.

I have for the past five years used the Jenkins' porcelains, and for all kinds of contour fillings, including restoration of the proximo-incisal angles, the severest tests to which any porcelains may be subjected. The secret of their use lies in the proper attention to the "firing." They may be blended in the same manner as the higher-fusing porcelains. They cannot be subjected to the same heats

without complete fusing and a tendency to spheroiding. I confidently believe that the Jenkins' porcelains are stronger when properly fused than the Brewster.

In regard to the production of the matrix, I would say that the form of cavity preparation has much to do with the material used as a matrix. I can produce a more perfect matrix with gold foil from the cavities cut than with platinum foil, and I believe a gold matrix can be removed from the cavity easier than a platinum matrix, and with less change of form in so doing. My method is to use a sufficiently large piece of gold foil to take the cavity and a large portion of the tooth adjacent to the cavity. After it has been pressed and burnished to place, fill it with a hard wax, and then it cannot change form in removing from the cavity. After removing from the cavity I insert in a mixture of equal parts of plaster and silex, being careful to get an accurate investment of the cavity margins.

In fusing the first porcelain body I am careful not to completely fuse it to a gloss surface; if this is done there will be spheroiding and a drawing away from the lateral walls. The proper fusing of porcelain is difficult but essential to success.

In cutting the cavities it is important that good, clean and definite margins should always be made. It is not necessary that the cavities should be saucer-shaped. There should, of course, be no decided undercuts, but the side walls may be more nearly parallel than when the platinum matrix is used. The gold will fold on itself or stretch so as to take in considerable angles.

As to the recurrence of caries about porcelain inlays, it is a fact that it does not seem to recur as with other filling materials. It may be due to the fact that the cement used in setting the inlay seals the dental tubules and thus prevents the solvent action of the pulp exudates. The non-conducting property of porcelain permits free use of the teeth without pain, and thus the teeth are kept cleaner by mastication. Less than two per cent of the inlays I have set in four years have failed, and I have set over three hundred in that time. There is no insurmountable difficulty in working porcelain; it is painstaking work and requires patience and skill. Just in proportion as these attributes are possessed, so will be the results when judgment is used in the selection of cases. No one should attempt to take up this work without practice or technical work on teeth out of the mouth. It requires no more time to learn than any other method of filling teeth, but it needs practice to make one capable.

Digests.

ART IN DENTAL PRACTICE. By S. G. Perry, D.D.S., New York. Read before the New York Odontological Society, February 17, 1903. From the dawn of civilization the real and the ideal have held the same relative relationship—the ideal ever in advance, beckoning from the dim borderland where the imagination makes all things beautiful, and the real near at hand, concrete and actual as the very earth on which we tread. Never, probably, while the body and the soul are united as they are in man will this relationship be changed. The man of affairs is concerned with the real, the man of imagination and aspiration with the ideal; but these conditions are never clear-cut and distinct. It is impossible to conceive of a man so absorbed with the real as never for a moment to long for some glimpse of the ideal; and we know that no man can live wholly in the ideal world, unmindful of the real one which supplies the conditions of his existence.

With the ideal world we associate things of beauty; with the real, things of utility. We know perfectly well what is meant by the term utility, but who knows what is meant by the term beauty? In architecture who can explain the joy that springs from the contemplation of the quality of proportion—that almost unattainable quality in which the Greeks excelled? In sculpture who can define the pleasure given by graceful lines? In painting, the subtle charm of color? Who will undertake to explain in cold, feeble words the joy given by musical sounds? What can be said of the pleasure, which is almost pain, that is sometimes caused by a beautiful landscape or a glorious sunset?

I have never found a satisfactory definition of beauty. I have studied the dictionaries and the encyclopedias, and have found long and elaborate attempts at definition, but no short, clear descriptive phrase. But this is not surprising, for beauty is so indefinite, so elusive, that language is yet too crude to fully explain it. Perhaps the best concise definition, that I must have somewhere seen, is that it is the revelation of an unseen reality. The force of this is felt in standing before the Sistine Madonna in the old gallery at Dresden. The soul is so clearly shown in the Madonna's face that the picture seems a living presence. It is a revelation.

If there is any logic in language, and any force in this line of reasoning, then beauty is a living presence. Unreal, and yet the most real thing we know! Elusive and intangible, and yet more real and lasting than any painted picture, chiseled marble, or builded temple that the hand of man ever attempted! If the future development of the race is to be along the same line as in the past, beauty, though intangible, will be a persistent force and a perennial source of joy until the works of man are resolved back to their elements and the earth is dissipated in cosmic dust.

It is not unreasonable to consider beauty as in some way linked to the soul of man—a sort of inarticulate language through which the soul finds means of expression; an ineffable something too subtle and fine for words. Art is its pupil—its devoted, adoring, ever-faithful pupil. I firmly believe that some traces of a love of art, and through it of beauty, can be found in any human being. In a savage it may find expression in and be satisfied with a bead, or button, or feather; while to a modern not even the Sistine Madonna can satisfy its inarticulate longing.

The Inspiration from Nature.—Since the beginning of time artists in all departments have received their inspiration from nature. Man cannot transcend his own experience, and he cannot get away from mother earth; the imagination, even, cannot take us into realms unlike those we have known. It might be said, then, that works of art are only works of nature idealized, and that art is great only when it is true to nature and false when it is not. This gives us a touchstone by which to classify the art of the world; and it holds equally in the plastic arts, in painting, sculpture, and architecture. Study two elm-trees that stand near enough for their branches to touch or interlock, and the open space between will give the outlines of a Gothic arch. Study an apple-tree in the same way, and you will have a suggestion of the Roman arch. If you want a model for the Moslem minaret or the steeple of Christendom, study the slender, pointed fir of most mountain regions. I know a tract in the Adirondacks that always makes me feel that I am in the midst of holy temples, so many evergreen spires are there pointing toward heaven! And so on through the whole range of art, there will always be found a reflex of nature. The Sistine Madonna is surpassingly great because it is so nearly a breathing, living woman. It is a greater work than the Venus of Milo because it has the color of life. The

sculpture is an intellectual conception or abstraction, but the picture is a breathing presence!

I said in the beginning that beauty appeals to the soul. Art in all its forms appeals to the emotions, and I am not sure but the two statements express the same thing. In all religions man has endeavored to make his temples, churches, and shrines beautiful. In Europe they are repositories of art. By painting, sculpture, and music the emotions are appealed to as in no other way. The statement, "Who can resist beautiful things!" is almost an axiom. The Master was taken to a mountain top and tempted by the sight of a beautiful landscape. In "Faust" Marguerita was tempted and gave way at the sight of the beautiful jewels. Some sensitive souls grow faint from the beauty and odor of flowers. Beauty, then, as expressed through various forms of art, is an ever-present force, and must be taken account of in every scheme of life we formulate.

The great primeval fact in existence is that man must be fed, clothed, and housed. The barbarian makes this an easy task. With the modern it is not so easy, for whether he will or not he must make his life beautiful by carrying art in every detail of it. His table service is a marvel of gold and silver and porcelain, his clothing an array of beautiful fabrics from all parts of the earth, and his house a dream in architecture and a veritable museum of art objects collected from all the ages. He grows unconsciously and inevitably into his inheritance, which is a love of beauty in every detail of his life.

Love of the Beautiful a Natural Inheritance.—In most old countries art has become woven into the very life of the people. Every building is constructed with a view to correct architectural effect, every gateway and fence is embellished in accordance with correct rules of art, and every landscape and garden is laid out with a view to ornamental effect. New countries absorbed in the conquest of nature, and too vigorous and active to have yet acquired the repose so necessary to the art life, may be lacking in the charm of the older countries, but in time this must be changed, for a love of art can never be strangled or crushed out. Already in this city is founded the "Municipal Art Society of New York," established for the avowed purpose of directing public taste in matters of city adornment, and what has heretofore been nobody's business is now the business of some of the most cultured and artistic men in our midst. This must be the inevitable tendency in all countries, because a love

of art is born into the race and is its most sacred inheritance. Love of beauty is well-nigh universal. A friend of mine, who has had vast experience in the art world as a dealer, told me that he considered the Chinese among the most artistic people of the earth for many centuries. He said a Chinaman of culture and refinement would hold a beautiful bowl, from which he was eating his porridge, in a manner expressing profound reverence for it as a work of art, and closing his eyes he would put it to his lips and almost swoon away from the joy of being able to eat from such a sacredly beautiful thing! A patient of mine in this city told me that a half dozen eminent Chinamen, invited to her house, as they entered the hall fell on their knees and touched their foreheads to the floor at the unexpected sight of a pair of beautiful Chinese vases that stood near the hat-stand. It was not an affectation, but a profound reverence felt by every one at the sudden sight of these works of art. A love of beauty so profound must always be an inspiring, vivifying force. Dull and meager, indeed, must be the life of anyone who feels no thrill as he looks out on God's beautiful world, or on man's reproduction of some part of it in convincing works of art!

Love of Art Universal.—You may ask, What has all this to do with dental practice? Why such a long preface with no hint of its application to the subject of the paper as announced? I have in mind a definite purpose in trying to show that a love of art is universal, and that it enters into the life of every one of us at every turn and during every hour of every day. Everything we touch or use made by hand of man testifies to this universal love of beauty. All articles of utility are made as beautiful as possible. If they had no graceful lines, no ornamentation, but were hideously ugly they would not be bought or used. The manufacturers understand this and make all their products as beautiful as possible. Even a penny toy is made as attractive as it can be, while in the domain of pure art, where the utilities are forgotten, that work which embodies most beauty is the one most sought and most liberally paid for.

The moderns must have beauty at every turn. If this be true of the things they use, the ornaments they wear, the houses they live in, and the thousand and one things they surround themselves with, then should they not be more than exacting in all matters that pertain to personal appearance? And in what can a fastidious person be more justly careful than in the appearance and condition of the teeth?

It is safe to say that the eyes and the mouth are the two most expressive features of the human face. The eyes have to be accepted about as the Great Artist made them. Man can do little to improve them after he has fitted them with proper glasses. He can take out a squint, and help them to work together, as he would teach a pair of colts to pull evenly, and if need be he can take out one and put in a glass substitute—which is always a good one to see the faults of one's friends through!

It would seem as if the eyes were the masterpieces of the Great Artist—His especial favorites to care for and shine through, His loopholes through which to look out on His world, His stained glass windows, tinted with colors mixed at His happiest moment. We sometimes look into them and see His heaven and feel His holy presence. The teeth are given over more to our care. It is as if the Great Artist had said, "I will make something for man to tinker with. I will wait to see if, after hacking, and filing, and killing, and neglecting them, he will finally grow into an understanding of My design. Of course he will some day, for I am gradually leading him to Myself. But it may be better to let him comprehend through his own experience."

Beauty of the Human Denture.—We are so accustomed to working upon the teeth that we do not often stop to realize what a wonderful combination they present. If the definition of beauty be extended somewhat, and made to include the adaptation of means to ends, then the natural teeth present a striking instance of beauty. The series of cusps or domes on the ends of the teeth, and the manner in which they interlock in a perfectly articulating set, taken in connection with the individual form of each tooth, is something that presents a beauty all its own. In the natural world I know of nothing to excel this in beauty of design. And when the teeth are considered in relation to the general features they become of the greatest importance. Here then we find ourselves as a profession brought literally face to face to the ever-present question of art in our care of them. The physician must keep his patients well; we must go farther and make our patients beautiful.

Each individual tooth is a study in itself. Take, for instance, the six upper incisors and cuspids. Imbedded in the gums in a healthful mouth they are models of beauty. Out of the mouth, and held against the light, every outline is a line of beauty. Not an abrupt

angle anywhere, but graceful curves everywhere. If by chance any of the roots are crooked or curved there will be a charm in their irregularity. Nature is never abrupt, but always expresses herself in curved lines.

Consider the outlines of these six teeth as they are when imbedded in the healthful gums. Could there be more variety or greater beauty in their shapes and their arrangement? We are so accustomed to them that doubtless we do not often notice the blended effect of the broad firm centrals, the delicate laterals, and the bold, striking cuspids. Nor do we often stop to study the charm of the outlines of their cutting ends. The centrals and laterals, straight across, but with their corners rounded off in a manner to satisfy the keenest sense of art, and the cuspids with their bold cones giving contrast and character to the combined six. Then note the direction of the roots, and the firmness with which they are placed in the jaws, giving great strength and permanence. Then study the attachment of the gums. Six wavy crescents with almost as much variety in their sizes and arrangements as we found in the six teeth themselves. But this is not all. Study the tapering enamel, and note the shelter given the gum that lies over it by the thicker enamel, thereby saving it from being stripped off in the natural use of the teeth.

Every festoon of the gum beautifully tapered, and resting secure in the sulci between the teeth made by the tapering enamel! In studying the six teeth it is easy to see that nature's first consideration in their design is their usefulness; but in addition what graceful lines—what faultless modeling! Not an abrupt angle anywhere, but each line melting away in accordance with the most exacting rules of art.

There is not time to consider minutely the bicuspids and molars, above and below, but there will be found the same marvelous modeling, and the same adaptation of means to ends. There will be found the same distribution of material in the manner that will give the most strength, and the same shelter given the tender festoons of the gums.

There is nothing about the teeth more beautiful than their articulation. I never study a perfect set that I do not marvel at the design, and there is nothing more striking than to note that in a perfect set the lower first molars articulate half their width ahead of the upper first molars; the lower bicuspids half their width ahead of the upper

ones, and yet at the front of the mouth, since the lower incisors are so narrow, they still have room inside the upper incisors. To me there is nothing more beautiful than this modest position of the lower incisors, and I have often thought the uniformity of the centrals and laterals, like an accidental in music, only accentuates and makes more beautiful the wonderful variety of the twelve front teeth.

Yet the front teeth are no more perfect in design than the back teeth. The difference is because of the difference of use. I wish there might be a way of dissolving out the dentin, leaving the enamel intact. What a series of marvelous shells we would have. Viewed from underneath every cusp would be a dome, the roof of which, laid with enamel bricks, would serve as a model for the greatest architect in the land. Set such an enamel shell from a molar down by the side of some colony of busy ants, and what a magnificent cathedral it would make for the little creatures, with its Gothic arches and its resounding domes! For their recreation give them a circus tent made by the enamel from a cuspid, and not one of them could save his entrance fee by crawling under the edge, or by cutting his way through!

On the other hand, if you would realize the value of the enamel, dissolve it off, leaving only the dentin. I think I never fully realized the significance of the enamel until one day I saw a patient from whose teeth the enamel was almost gone from erosion. It was a funny sight, for every tooth was a caricature. They looked like a row of doddering, bald-headed old soldiers, whose occupation was gone, since they did not stand shoulder to shoulder and could therefore be of no help to each other. Having no lateral support, what could you expect from such a row of pegs? Just what you see where the file or wheel is passed between the natural teeth and their shapes not restored in filling.

Art Principles in Professional Practice.—It is not my purpose in this paper to enter the field of orthodontia, and endeavor to show the importance of correct position of the teeth, considered in relation to the general features. That is a subject by itself, and one of the most fascinating in the whole range of our practice. I hope, though, that what I have said on the subject of art will help to emphasize the importance of it in all its bearings. But I want to say a word in reference to the application of the broad principles of art to the

selection of filling materials, the construction of fillings, and the general care of the mouth and teeth.

You may remember that for a great many years I have missed no opportunity to protest against the display of gold in our work upon the teeth. And for still many more years I have pleaded for the restoration of their shapes in filling; in season and out, this plea dates back over a quarter of a century. All these years I have met with discouragement all along the line, but I have never for a moment lost hope. I have never doubted that in time our profession would be aroused to a fuller realization of the marvelous beauty, as well as utility, of the human teeth, and in its work upon them be filled with more of the spirit of reverence that the true artist always feels when face to face with nature, the great source of all inspiration. In the early days the great sin of our profession was the disregard of the shapes of the teeth. The separating file and the Arthur disk wrought ruin wherever the pseudo-science—not the art—of dentistry prevailed. Then came the gold crown with its vulgar bid for practice; then, as if to show to what depths of bad taste some people can fall, came the diamond flashing in the human mouth like the headlight of an engine! Fortunately this was a freak of eccentricity, and was not practiced by any respectable practitioner. Shades of the great departed in art—what must you think of us if you are given the power to see us when we do such things!

But the hour of delivery is near at hand. The introduction of porcelain restorations is bringing about a rapid change. It is no longer necessary to use gold in the front of the mouth, and the glittering display of that inharmonious material is a thing of the past in the best practice of to-day. The demonstration of the possibility of such practice insures its adoption, for our patients after seeing it will have nothing else. Most of them are sure to have the artistic instinct, if we have not, and we are compelled to fall in and march with the procession or be left behind.

I did not suppose that I should live to see the time when such a rapid development of the artistic side of our profession could occur. A great many years ago before this society I predicted that the time would come when the display of gold in the human mouth would be considered barbarous. That time has come. If a break occurs that cannot be corrected with a porcelain inlay, the tooth can be cut off and crowned with porcelain, and for the sake of art I think that prac-

tice justifiable. If the work be properly done the root of a freshly devitalized tooth can never give trouble, and surely we are able to make the crown permanent. This rapid change in practice is an object-lesson in evolution. The old way must be abandoned from the moment a better one is found. This development of the artistic in our work has come to us only after a long time, but it has been worth waiting for. But it does not bring us unalloyed joy, for in some respects it makes our tasks harder. Our first duty is to save the human teeth, artistically if we can, inartistically if we must. Here must be met a conflicting set of conditions that, to one who has an instinct for art in his work, can cause more perplexity and unhappiness than all other things in dental practice combined.

Conditions Which Compel a Compromise With the Ideal.—The true artist has the power of seeing his work completed before he has made a stroke, and only that completion can satisfy his soul. How absolutely depressing and benumbing then, is the task of the dentist, who rarely finds it possible to do in the human mouth what he would like to do. He cannot linger in making a beautiful outline of his cavity, or in giving a graceful curve to his filling, with a nervous, wincing patient asking every moment if it is nearly done, and watching the clock in a manner to remind him that the charge is to be ten dollars per hour! And what encouragement for him when, in a case in which he would be glad to make a gold filling, he is compelled, because of the nervousness of his patient or from inability to pay, to use a plastic of some kind.

Under these trying circumstances, with the art impulse swelling in his soul, with what dismay he thinks, by way of contrast, of his fellow artist of the brush whose impassive canvas gives no sign, or of his brother of the chisel whose marble never winces and never shows a sign of life until his task is done! He must shut out from his life the gratification of his artistic instincts, and find such consolation as he can from the utility standpoint of his work. He must fix his mind upon what can be done for the benefit of his patient, and, forgetting his own desires, endeavor to grow into a knowledge of the pleasure of renunciation. Perhaps it would be more nearly correct to say the pain of renunciation.

Imagine the despair of trying to do artistic work with the procession on the street turning in at your door, and some impatient members thereof "jawing" with the attendant because of being kept

waiting so long, and others, after waiting an hour or more, going away "mad" because of not being allowed to speak to the doctor! Consider also that auxiliary of art, the modern telephone, bringing at the same moment from the four corners of the earth messages of the needs of patients who cannot wait! With an appointment-book filled six weeks in advance the only answer that can be given is, "Come in after office hours." At that late hour humanity is streaming up town, and finds it convenient to "run in and see the doctor a moment." By the time the mob has assembled the doctor wishes he could lie down and die. Since he must live, his only course is to let art go to the devil, and then to apply himself to the task of doing the most good to his patient in the fewest number of seconds at his command! Is the task of a professional man with an overflowing practice an easy one? It is the most cruel tyranny on earth to-day!

And yet, above all this chaos serene as the night shines the beautiful star of art; and if we old fellows who are so perplexed and unhappy cannot feel its gentle influence, throughout the length and breadth of the land there is a splendid array of young men with more time who can and who will feel it more and more—for as I said before, the power of art is a veritable force that must be reckoned with, and our profession, beneficent almost beyond any on earth, presents a singularly fitting field for its beautiful ministrations.

Selection of Materials.—In the selection of materials for filling the busy operator encounters the same discouragements. In many cases in which in restoring the contour of a tooth he could get the best results with gold, he is debarred from the use of that material by the inability of the patient to bear the strain of the operation or to pay for it. He must then do the best he can with materials he dislikes to use. If his patient be able and willing to pay, but is a bundle of nerves and a person for whom no one can do good work, his task is still harder because more is expected of him. Here again he must do the best he can, and he alone is competent to judge the results, for only he can know the conditions under which the work was done. For this reason I have made it the rule of my life to be very guarded in criticising the work of other dentists. I remember one instance many years ago that taught me a lesson. A patient came to me saying she had been under the care of a man whom I knew had a worldwide reputation. The work was so poor I thought there must be some mistake, although I said nothing. After working

for her an hour I concluded that the dentist had done marvelously well. He had done far better than I was able to do, for I am not so constituted as to care to fight for my reputation.

There is a "happy medium" in all things, although in our profession, if we love to do things in an artistic way, most of our work must be done in a manner suggesting an unhappy medium.

In the selection of materials there is not much choice from the artistic standpoint, for they must be judged by their lasting qualities. I never yet strapped a patient's beard to the head-rest and put a prop in the mouth to keep it open in order to be able to do good work.

It is not easy to imagine any material more offensive to the artistic sense than amalgam. And yet who dares to exclude it entirely? I do not; I could not get square with my conscience if I should. Although such an inartistic material, it has one redeeming quality—in its plastic state it can be used as the sculptor uses his clay, and the outline of the tooth can be modeled with it in a manner to satisfy the keenest artistic sense. The advantage arising from the restoration of contour in many cases is more than enough to outweigh its inherent defects as a filling material.

There is great pleasure in the use of the oxyphosphate cements because of the ease of modeling and the better color, but alas! the utility side of the question obtrudes at once, and since they do not last we cannot make great use of them. When they are made to be more durable—as I believe they yet will be—and the manufacturers of them have sense enough to give us a far greater variety of colors, I think they will have greater value. Instead of five colors we should have twenty-five, with a little sample of the mixed cement attached to each bottle. The advantage of being able to accurately match the color of a tooth, and to quickly restore to shape, must always compel the use of these cements. I believe they are yet only in their infancy. When they are made to be more permanent, and of better color, it will be an unspeakable pleasure to model with them.

In the restoration of the shapes of the teeth in the back of the mouth, where it cannot be seen, gold in my judgment still stands supreme. It is hard to use and is inharmonious in color, but it has the quality of permanence, and it can be modeled to the outline of the tooth. I know of no greater pleasure than, with the plugger in my left hand and the lead mallet in my right, to see a filling grow into the lost shape of the tooth. Little by little the work goes on, and if

there is weariness of body there is refreshment of soul as the filling takes shape, and the design of the Great Artist is worked out.

And by the way, though not strictly in the line of this paper, let me mention a matrix I have devised for restoring the proximate contours of teeth. It is a separator and matrix combined. In the August *Cosmos* of 1885 I described and illustrated a matrix designed to be held in position by any one of the separators described in that issue. It was a simple piece of very thin steel, shaped to conform to the festoons of the gums, and made of varying widths to suit cavities of different sizes. I have used that matrix almost daily from that date until recently. I have always considered it one of the best in use, but it has often been puzzling to adjust, as is generally the case with devices that consist of separate small parts. Recently it

FIG. 1.

FIG. 2.

occurred to me to solder it fast to the jaws of the separator, and so make a combined separator and matrix. I did this, and the first trial convinced me that I had overcome all the objections and now had a faultless device. (See Fig. 1.) The marvel is that I or someone else had not thought of this before. Being in a single piece it is easily adjusted or removed, and when the screws are turned it is held immovably. (Fig. 2.) This firmness is of the utmost importance in any matrix. In this case there is only one thickness of steel, which can be very thin, so that a perfect restoration of contour is assured. It is easily made, as anyone can attach the matrix to an old separator with soft solder. It works well if soldered only at one end; in fact, it conforms to the contour of the work even better if so soldered.

Art in Dental Instruments.—In designing instruments for preparing cavities, as well as for filling, there is always the opportunity for the expression of the true art feeling. It is a nice matter to shape an instrument so that it shall have strength where strength is needed and delicacy of the highest order where delicacy only will avail. I am laughed at sometimes because I have one hundred and seventy-

five excavators in my working set. Most operators consider it not necessary to have so many different shapes. It is true that some of them may not be used many times in a year, but since each one is designed for a purpose, when the moment comes for its use it is better suited than a utility instrument that will answer in a dozen different places. The instruments are numbered and are out of the way on their racks when not wanted, but can be found in an instant in the dark when they are needed. I had rather give them storage, and pay the interest on their cost, than to miss their perfect adaptation to the work to be done. There is a refinement possible in instruments that it takes almost a lifetime to acquire. What an unspeakable joy to use a dainty instrument that is a work of art in its proportions and its curves! With it work is no longer work, but is the fulfillment of an inexpressible longing of the soul! I shall never forget that Dr. Corydon Palmer once said to me, "It is a great pleasure to do a nice thing in a nice way." What I have said in reference to excavators holds equally true of pluggers. I consider that there is the same need of a wide variety of shapes and sizes in order to get the best results in the quickest and neatest way.

The Real and the Ideal.—One of the most fascinating branches of my subject—and the one you have doubtless expected me to make most prominent—is that of the construction of artificial teeth, and the design and adjustment of various structures for the mouth. There is not time to-night to attempt so large a subject. It is worthy of an elaborate paper by itself. The contemplation of it gives great pleasure, but carries with it a minor chord of pain. The pleasure lies in dreaming of the beautiful possibilities when considered from the standpoint of art, while the pain of it comes from contemplating the hurried and commercial manner in which it is done in these days of cheap materials and cheaper methods.

Not even the best of us approach the work in the true art spirit, or give it the time that must be given to produce anything fine in any department of effort. Some operators will not touch it because they consider they have not the time to do it all themselves, and because they cannot find anyone to do it in accordance with their ideas or up to their standards. Most of us, I presume, have the work done as best we can, and mentally mourn over it, while the patient beams with delight and calls it beautiful! It is a repetition, though even more wearing to body and soul, of what I described in noting the

deadly perplexities of an overflowing practice. I do not say that beautiful work of this class is not being done throughout the length and breadth of the land. Without a doubt there is more of it to-day than ever before, but I think the fact remains that in most offices it is done hurriedly and commercially, and with little thought of art in all its details. If the teeth are of the right size and color, and are in their proper positions and look well, and are paid for, everyone is happy, though the tongue of the patient may encounter a clumsy foreign substance and may search in vain for the clearly defined and nice-feeling teeth that Nature gave—patient Nature, who has time to work as perfectly over things that are never seen as over things that are never out of sight.

Some day we shall have artists who will consider that the inside of the arch is entitled to as careful consideration as the outside—that things unseen must be as perfect as things seen! When that happy day arrives I shall not see a patient from the hands of a foreign dentist with a formless mass of gold cemented over the upper and lower teeth so thick and heavy that if the patient were to fall overboard he would be drowned! With the same weight attached to his feet he might be saved, but with it in his mouth there would be little hope for him! The shape of the lower jaw is like a horseshoe, and when I saw the structure cemented over the teeth I thought if I had it out I could pitch quoits with it.

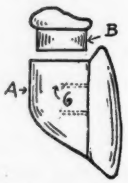
After all the fine things that we may say about art and beauty in our work, the fact remains that our first duty is to save the teeth, and our next to do it as quickly and easily as we can. I do not think we have a right, at ten dollars an hour, to fuss and fiddle in finishing a filling just to satisfy *our* sense of the artistic. Such a statement as this may seem to be a contradiction of the theme of this paper. I make it in order to show more clearly that inevitably the range of our work lies between the two conditions I set out with, the *real* and the *ideal.* It must ever be so. We work upon living, sensitive tissue, and of course all our work is done for others; if we worked upon wood or stone or canvas we could work for ourselves. A week or a year spent in painting a picture would be solely our own business. Two hours spent on a filling which could be as well done in one is equivalent to stealing ten dollars from the patient.

In conclusion, how can we logically escape from the tangled maze of contradictions that we find when we try to reconcile the real and

the ideal? In the first place, we must not forget that no other specialty of the healing art bears the same relation to art in its broadest sense as our own. Medicine and surgery must keep the world well; dentistry must help to do the same, but, as before stated, it must go farther and make it beautiful. Naturally and very properly dentistry from the beginning has unconsciously been called an art. It will be so considered to the end of time. If it is to be even more than at present considered a branch of medicine, it will be rated as the artistic branch of that great profession. Then we must foster and encourage the artistic in our work. We must cultivate the art instinct in ourselves, and we must try to impart it to our patients. We must resist the rapid spirit of the age, and strive for serenity of mind and body. We must do our work more patiently and more artistically, and then it will be better done. This brings us back to the utility side of the question, and points the way to the realization of that which has been the dream of the ages—the bringing together of the real and the ideal.—*Cosmos.*

NEW DEPARTURE IN CROWN AND BRIDGEWORK By Byron W. Haines, D.D.S. In the course of my experience with crown and bridgework I have met with many failures, owing to the fracturing of one or more porcelain facings, rendering it necessary to remove the entire bridge or crown and the pin from the root, wrecking the bridge and endangering the root, as in case of what is

FIG 1



known as the Richmond or Standard Crown. Consequently I have suggested a new device, which is termed "*The Box Tooth Crown with Adjustable Facings.*" While I am aware that in bridge and crownwork it is not new to imbed the pins of the porcelain facings in cement, I claim an improvement in that each of my boxes corresponds to an individual tooth space, with opportunity for direct action on tooth pins, and in case any one of the facings is broken

off or needs adjusting, only its particular box need be opened and cleaned. This can be done without disturbing in any way the remainder of the facings, as is illustrated and explained below.

Figure 1 shows side elevation and sectional view of box with telescopic cap (b). The cusps are soldered to top (b) so as to overlap receptacle (a) at its upper margin. When the removable occluding surface, such as is shown in Figure 1, is used, the overlapping edges of the cusps are burnished to form a smooth, tight joint with receptacle (a). The facing is ground to fit the case, and then backed in the usual way. The backing is then removed and solder flowed on the box side of backing. The backing is then replaced and the box is adjusted with the cusps in place to suit the occlusion. Attach box to backing with soft wax, then remove the box and backing together from the facing, slip out the cusp and attach the box to the backing by placing in a flame and causing the solder to flow or sweat backing and box together. This receptacle may be filled with cement covered over with a gold or amalgam filling, so as to protect the cement, and also to form an occluding surface. When cap (b) is used the receptacle is filled with cement and while it is still soft the cap is pressed to its position and the edges burnished to make the tight joint.

As Applied to Bridgework.—Figure 1, with parts intact, represents a tooth space, and they are waxed together according to the requirements of the case. Then the facings are clipped from their backings and the boxes invested with their abutments; solder together, being careful not to allow the solder to flow in the box. When a pin abutment is used the face of the root is metal-covered, as in the usual pin tooth. Then place the box with facing in proper position, soldering box to root facing.—*Gazette.*

RETRUSION OF BOTH JAWS WITH A SINGLE APPLIANCE. By Rodrigues Ottolengui, M.D.S., New York. Read before the American Society of Orthodontists, October, 1902. The object of this brief paper is to place on record a principle in relation to the management of double prognathism, which I have not elsewhere seen discussed by specialists in the field of orthodontia. Briefly stated, it is that in many cases, especially where the treatment is begun early in the life of the subject, no appliance is needed upon the lower jaw, it being possible to so form the apparatus for the

upper jaw that the lower arch may be simultaneously retruded; in some instances, as in the case which I shall report, the upper natural teeth may be made to serve as an inclined plane which will carry the lower anterior teeth backwards; in others, as where the reduction of the upper arch is conducted with the mouth bit and skull cap, the mouth bit may be made to act as the inclined plane. There will, of course, be still other cases where the lower teeth will require special apparatus.

Classification. Before giving the details of this case I beg the privilege of asking for some light upon the modern doctrine of classification. It seems to be the generally accepted view that all cases of irregularities may be made to drop into definite sections of a prearranged classification. I have no doubt that this is true. Dr. Angle has given us such a classification, and I am in accord with his scheme of making the fundamental principle an investigation of the occlusal relations. By the majority of practitioners the Angle classification has been indorsed as being entirely comprehensive. At the last meeting of this body, however, Dr. Wm. Ernest Walker questioned this fact and expressed the view that in addition to considering the occlusal relations of the teeth, if classification is to serve as a basis of adopting a scheme of regulation, it might be wise to add to this a study of the relation of the jaws to the physiognomy. Otherwise, he claimed, we must have cases in a stated class which nevertheless would require diametric modes of treatment. This view appears so logical that it has seemed strange to me that no formal expression of opinion upon Dr. Walker's proposal was made at last year's meeting.

Premising my remarks by admitting that I cannot claim to fully comprehend what the language of either Dr. Angle's or Dr. Walker's classifications mean, and thereby admitting that either or both may be entirely correct, and that it may be my own ignorance both of language and of orthodontia which creates my mental puzzlement, I make my criticisms, explaining that I do so for my own enlightenment and not for the purpose of belittling the work of others.

The case which I am to present to you to-day is one in which the occlusion in the posterior regions is practically normal. In relation to the physiognomy the anterior portions of both jaws are prognathous. Analyzed, this means that the upper incisive region is protrusive in relation to the upper part of the face, while the lower incisive region is protrusive in relation to the chin; the forehead, nose

and chin are in normal physiognomic relations. I do not find myself able to place this case under any section of either the Angle or the Walker classification.

A word more and perhaps my difficulty of comprehending these gentlemen may become apparent. The object of language is or should be to convey thought; in scientific matters the language should be direct and readily comprehended by even young students of the science to which the language is supposed to contribute. Now I find that in describing the occlusal relations of the jaws both Angle and Walker have adopted the terms "mesial" and "distal." They also use the hyphenated term "mesio-distal," which my mind fails to grasp with certainty. The best that I can make of this is, that by "distal" is meant the posterior part of the mouth, and perhaps this may serve. By mesial is meant the anterior, or more definitely speaking, the incisive and cuspid region. But this is only guesswork on my part, for the word "mesial" does not have any such meaning. "Mesial" means towards the median line or center; more strictly, it means at the center. Thus, if I am told that the jaws are "normal in their mesial relation," I have a right to conceive that I am told that the median lines of the two jaws are coincident, a fact which often is not true, and which then becomes an important factor in the correction of the abnormality. If it be true then that in these classifications the word is not meant in its true significance and has no bearing upon the median line, but is used to indicate the forepart of the mouth, I respectfully submit that we should better follow the rules of surgery and employ the term "proximal" as the antithesis of the word "distal." In general surgery "proximal" means that portion of the subject nearest to the observer, and distal that point farthest from him. In regard to the hyphenated term "mesio-distal" I ask, What is meant? The combination being new to me, and I think not heretofore used by any author, I can only seek analogous language for its elucidation. In describing tooth surfaces we have, for example, used the term gingival in relation to approximal cavities, to indicate that part nearest to the gingiva. From this we have the compound word "bucco-gingival," which means that point where the buccal surface meets the gingival portion of the approximal surface. Similarly we have linguo-gingival. Does mesio-distal then mean that part between the distal and the so-called mesial, let us say the cuspid region? I think the term is meant to convey the idea that

would be more accurately expressed by the words "mesial" *and* "distal," supposing that mesial is to be used at all. "Proximal and distal" would be more intelligible. It is true—and I mention this to forestall the use of the fact as an argument—that some authors speak of "disto-approximal" cavities, but such use does not make the language correct. It would better be written distal approximal, for the idea to be conveyed is that the cavity is both distal and approximal, terms which are in no wise contradictory. Mesio-distal, on the contrary, is the union of antithesis. If the whole occlusion is meant, the hyphenated contradictory terms are superfluous. It should suffice to say "occlusion normal."

Case from Practice. Admitting then that I cannot classify my case, I herewith submit it for your consideration. The patient presented with an irregularity as shown in the models. (Fig. 1.) I

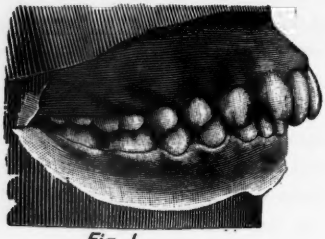


Fig. 1.

have so trimmed the upper and lower edges of these models that in the one the line of the base of the nose and in the other that of the chin is indicated. All forward of that represents protrusion, the child exhibiting a horrible pouting mouth. This, coupled with the irregular placement of the teeth and the parting of the lips, which exposed them constantly, created a great deformity. A study of the models showed the arches to be of normal width, and the posterior, or, if you please, the distal occlusion, normal. The necessary course, therefore, was extraction of the four first bicuspids and reduction of both arches. My first purpose was to have operated on both jaws simultaneously, using a fixture on each. The depth of the overbite, however, led me to believe that something would be gained by carrying the upper teeth back to some extent first, lest the upper cuspids hinder the backward movement of the lower cuspids. I therefore constructed an appliance for the upper arch. This consisted of a

roof plate made of iridio-platinum held by clasps around the molars. To these clasps was attached the Jackson retraction wire crib, and the work was begun. By the time when the gain in the upper jaw was appreciable I noted that the lower jaw was being simultaneously corrected, the overbite being sufficient that the upper incisors acted as an inclined plane which carried the lower teeth backwards. The case was therefore completed with this appliance, no instrument whatever being used on the lower. The final models (Fig. 2) indicate the present condition, and show how completely the space made by the removal of four teeth has been obliterated. The irregularity of the central and lateral, observable in the casts, is slight and less apparent in the mouth than in the models. A better result was not sought in this locality because of an accident. The retrusion of the upper arch to some extent also regulated these two twisted teeth, much more

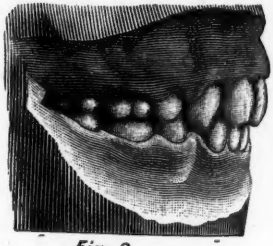


Fig. 2.

so than would have been suspected at the outset, except by one who had had similar experiences. The retrusion being completed, steps were taken towards the rotation of the teeth, and this had been nearly accomplished when a child companion struck the little patient in the mouth with a Fourth of July horn, and so injured a tooth that I feared death of the pulp. It being then almost time for the summer vacation, I applied a retaining fixture. In the autumn the parents decided that the result was sufficiently satisfactory, in view of the interruptions of school attendance which would have been required to fully complete the work. This, however, is merely an aside, the models being exhibited as an example of double retrusion and not as bearing upon the regulation of ordinary irregularities of individual teeth.

A word in relation to the fixture utilized. In cases where I decide to work entirely within the mouth—that is to say, without resort to

the skull cap—I always feel that the roof plate is desirable as a help in avoiding the tipping of the molar anchor teeth. For this reason, even though I may utilize the Jackson retraction crib, I attach it, as in this case, to the clasps of a roof plate. I have found, however, that the bending of the front retraction wire from time to time, as is necessary to increase pressure, will cause a tipping of the forepart of the plate, so that it is removed from contact with the roof, thus preventing the very use for which it is constructed. With great care the wire can of course be so bent that the adjustment will be accurate, but in my hands at least this has often been a time-consuming detail. More recently I have therefore found a means of obviating this difficulty, and the plate which I exhibit (Fig. 3) will demonstrate this, though it is not the plate that was used in the case under dis-

Fig. 3.

cussion. In such cases now I add to the buccal sides of the clasps small staples, and the retracting wire instead of being soldered to the clasps is attached by a curved loop passing through the staples. In effect this method of attachment operates as a hinge, and thus the bending of the front wire in no way displaces the roof plate. I have found by experience that the loop on the ends of the wire should be large to allow free play.

I wish to add that this case was regulated five years ago and that the final models were taken during the present summer. At the outset I stated that similar results might be obtained when the use of the skull cap is considered the proper treatment. This I based upon two cases that have passed through my hands—one successfully completed some years ago and the other still under observation. In

these cases the mouth bite is made to extend over the incisive edges of the upper teeth, and an inclined plane is attached to the lingual surface thereof, care being taken to make it long enough to certainly engage the lower teeth.

In all these cases the treatment must depend largely upon the extent of the overbite. Where the overbite is short it will be necessary to attach the inclined plane to the upper fixture, because otherwise the locking of the natural teeth will be insufficient to carry the lower teeth back. Again, progress must not be too rapid. It must be remembered that the greatest strain will be upon the upper teeth, which, if the work is pushed, will be retracted so rapidly as to cease to engage the lower. It may therefore become essential to resort to periods of rest, the inclined plane improving the occlusion and retracting the lower teeth, while the upper teeth remain stationary. Also, I must advise that special note be taken of the direction of the lower incisors in relation to the alveolus. If they be erect the procedure will be safe. If, however, they tip labialy, meeting perhaps in an edge-to-edge bite, or with but slight overhang of the upper, it will be necessary to begin work upon the lower with a separate fixture, retracting the incisors until they assume an upright position, after which they may be carried back with the upper fixture.—*Items.*

TWO CROWNS: AN ILLUSTRATED LECTURE. By R. M. Sanger, D.D.S., East Orange, N. J. Delivered before the New York State Dental Society, May 13, 1903. The two processes which I show you to-night have been of such assistance to me that I deem it my duty to present them to the profession at large. I have applied for a patent on the half-collar crown in order that no one else may do so and attempt to mulct the profession for the privilege of using it. I am glad to give it to you for what it is worth, and ask in return only that it shall bear my name.

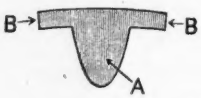
The first is an illustration of my method of restoring a fractured root, and its preparation for the reception of a crown. Of the many problems that present themselves for solution in our daily practice probably not one is more disheartening than that of an incisor or cuspid root which, having been crowned with a bandless crown, has finally fractured and whose crown is loose or entirely lost, while the fractured piece is still held loosely in place by the gum, the balance of the root being firm. The first step is to carefully remove the

fractured piece of root and preserve it for future use as a pattern. The hemorrhage is checked with adrenalin chlorid or some good hemostatic, the raw surface cauterized with trichloracetic acid, and anesthetized with cocain. The space between the root and gum is then packed with gutta-percha, and the patient dismissed for the day. As you are aware, gutta-percha expands, and the gum will be forced back sufficiently to give free access to the edges of the root along the line of fracture, presenting a condition such as is illustrated in Fig. 1. At the same time the gum will heal, so that little or no hemorrhage will occur during the subsequent progress of the work.

A piece of soft platinum plate, gauge No. 32, is cut to about the shape of Fig. 2, the fractured piece being used to determine the shape and size of the apron portion (Fig. 2, A), while the wings (B, B, Fig. 2) are made sufficiently long to reach around the entire root in the form of a collar. With an ordinary pair of clasp-benders the platinum is shaped to fit the fractured piece of root (Fig. 3), and it

FIG. 1.

FIG. 2.



is then placed in the mouth and the wings are brought around the root to complete the collar form. It is then removed and soldered, and we have a collar with apron as represented in Fig. 4. A piece of flat platinum plate, gauge No. 30, is then placed across the end of the collar mesio-distally and soldered to the edges. (Fig. 5, A, A.) It is then placed back on the root and perforated for the reception of the tube and pin. A seamless platinum tube is procured by fracturing an Ash tube-tooth. A piece of round platino-iridium wire which perfectly fits the tube is passed through the tooth and held in position while the tooth is broken away from the tube, thus preventing the marring of the tube, and you have a strong platinum tube with a pin which fits it exactly.

With your collar apron in position in the root the tube and pin are pushed through the perforation and up into the canal as far as possible, and then with a sharp instrument or penknife the tube is split and folded down on the flat piece as illustrated at B, Fig. 5. It

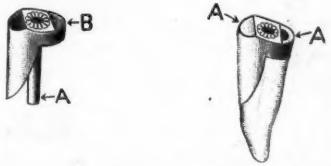
is then removed and soldered and we have the construction represented by Fig. 6, which is ready for final placing on the root in the mouth. The method of setting is as follows: The pin is placed in the tube to prevent the oxyphosphate from passing into the tube and to serve as a handle to hold the piece firmly while packing the amalgam. A small amount of cement is placed in the canal and around the end of the tube (Fig. 6, A), also around the inside of the band, where it engages the root (Fig. 6, B). The piece is then placed on the root and held firmly until the cement hardens, when the bal-

FIG. 3. FIG. 4. FIG. 5.

ance of the space around the pin and between the apron and the root where the fracture occurred, is packed with a quick-setting amalgam through the openings at A, A, Fig. 7. The last illustration (Fig. 7) shows the work completed and ready for the reception of the crown, which is made with a band after the Richmond pattern, the platino-iridium wire being used as the permanent pin, as illustrated in the working model which I have passed around.

The Sanger Half-Collar Crown. The second crown to which I

FIG. 6. FIG. 7.



call your attention is what I have denominated the Sanger half-collar crown. I am fully aware of the fact that half-collar crowns are not new, but the difficult and unsatisfactory methods of constructing them have deterred many from attempting their use, preference being given to the full collar. It is in the belief that I have found a simpler method of constructing a crown which will give all the advantages and none of the disadvantages of the collar crown that I make this presentation to you.

The procedure is as follows: A piece of pure gold plate, gauge

No. 30, is cut to about the shape of Fig. 8. Being annealed, it is grasped at the straightest edge (Fig. 8, A) with a pair of clasp-

FIG. 8.

benders, and hammered down to the flat end of the benders with a small riveting hammer (Fig. 9) until it assumes the shape shown in

FIG. 9.

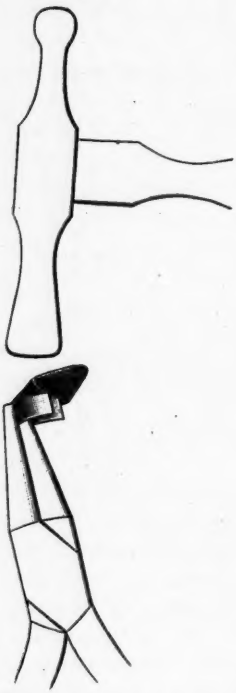


FIG. 10.

FIG. 11.

FIG. 12.

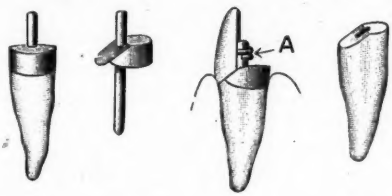
FIG. 13.

Figs. 10 and 11. With a pair of curved shears it is cut along the collar on the outside at A, A, Fig. 10, and trimmed down so that the

metal tongue will pass between the two free edges of the collar, as in Fig. 12. It is then placed on the root in the mouth and burnished and trimmed to fit, the root having been previously shaped as in Fig. 17. It is then carefully removed and soldered along the free edges on the outside and the points cut off, giving you a half-collar cap, as shown in Fig. 13, which perfectly fits the root. The balance of the work is the same as in the construction of any backed and soldered crown.

If, however, you desire to construct an all-porcelain crown, No. 32 gauge platinum is used instead of pure gold, and the two ends (Fig. 12, A) are not cut off, but are burnished down on to the tongue, when the cap is burnished to shape in the mouth, to give additional stiffness, and then soldered with pure gold or platinum solder where they lap. The cap is again placed on the root and a platino-iridium

FIG. 14. FIG. 15. FIG. 16. FIG. 17.



pin is pushed through the cap, but instead of cutting it flush it is allowed to extend above the cap, as in Figs. 14 and 15. A little sticky wax is placed on the pin and cap, and they are carefully withdrawn and soldered together on the outside. A cross-pin plate tooth is selected and ground to fit in the mouth with the cap and pin in position, the pins are bent around the post as in Fig. 16, and with the aid of a little sticky wax it is all withdrawn, invested, and soldered at A, Fig. 16. This holds the facing firmly in position while the porcelain is built up and baked to the proper contour on the lingual surface.

Now, it must be obvious to you all that a half-collar cap made in this way has the advantage of giving you all the strength of a full-collar crown, the bevel on the front of the root corresponding to the front part of the band of the full collar without its unsightliness, while the half collar at the back gives strength where the strain is greatest.—*Cosmos.*

IS THE SYMMETRICAL EXTRACTION OF THE FIRST PERMANENT MOLARS A JUSTIFIABLE OPERATION? By Dr. E. Förberg, Stockholm. (*l'Odontologie—Cosmos.*) This carefully written paper proves conclusively the error of extracting the upper and lower first molars. The author reviews the arguments set forth by the advocates of the symmetrical extraction of these teeth and shows that they are based upon false premises. He questions the correctness of the two propositions advanced by the late Dr. Andrieu in favor of extraction, as follows: Dr. Andrieu stated that the first molar is more susceptible to caries than any other tooth. The examination of the teeth of 18,000 school-children of Sweden by the author of this communication has, however, shown that the percentage of caries in the second molar at the age of fourteen to fifteen is greater than that of the first molar at the age of seven to eight years. Hence, from this fact, the conclusion can be drawn that immediately after its eruption the second molar is more likely to become carious than the first molar is at the age of seven to eight years. "Besides," Dr. Förberg says, "my clinical experience has shown me that after the twelfth year—that is, after the disappearance of its dangerous neighbor, the deciduous second molar—the permanent first molar is less susceptible to caries, while at this same period the susceptibility of the second molar to caries increases very largely. The first molar is hence after the twelfth year a more resistant tooth than before." From the above discussion it can be seen that, as the tendency to caries of the first molar after the tenth year is less than the susceptibility of the second molar to the same disturbance, it would be irrational to practice the extraction of a first molar in order that the second molar, which is a weaker tooth, should take its position. The second proposition advanced by Dr. Andrieu was that the extraction of the first molar would give more room to the other teeth. The essayist admits that teeth in close contact are more liable to the ravages of caries than those in which a space is found between each individual organ, but at the same time he endeavors to demonstrate the fact that the extraction of the first molars does not result in the gaining of the space referred to.

Discussing the evils caused by the extraction of these teeth, the fact appears that reduction in the force of mastication is not the only consequence, for after extraction of the teeth referred to, and until

eruption of the second molars, mastication, as the author shows, has to be carried on by the front teeth, and thus this important process is interfered with just at a period in the physical development of the child when thorough mastication is absolutely necessary.

Another evil following extraction of the first molar consists in the lowering of the articulation and in some cases the production of a prognathous condition of the front teeth. Regarding the question of gaining space, the writer states that as soon as the first molars are extracted nature endeavors to repair the damage by changing the position of the teeth, and that while there is a gain in space this is only temporary, as the remaining teeth continue to move, unless prevented from so doing by the articulation, until they are in close contact. By extraction of the first molar the occlusal curve of compensation becomes flattened and the normal force of mastication is reduced. This condition of things takes place if the teeth in both jaws follow the same direction, but if one among these teeth be prevented from moving by its antagonist the result will be the formation of small interstices brought about by the inclination of the teeth. In these interstices food débris accumulates, which pressing against the gum destroys the regularity of the gingival outline, a condition which is followed by deleterious results. He also calls attention to a condition which has not been sufficiently studied, *i. e.,* the influence of the extraction of the first molars upon the growth of the mandible, which, as is well known, grows by the apposition of new osseous cells behind the first molars, and in this way necessary room is provided for the molars that erupt later on in life. But as nature does nothing without a cause, when the first molar has been extracted the second molar takes its place and the backward development of the mandible does not occur. Hence extraction of the first molars not only reduces the force of mastication, but also disturbs the arrangement of the articulation and produces no favorable changes whatever.

CHIPS. By S. J. Spence, D.D.S., Chattanooga, Tenn. The extent to which my two articles, "A Few Little Pointers," were copied encourages me to launch forth a few more such small practical points, which I now name "Chips," because chips float where more solid and massive matter sinks, as was exemplified by the very opposite receptions—as indicated by copying—accorded said

"Pointers" and some long records of very important experiments in plaster of Paris which I also published last year. The latter seemed to sink out of sight.

To Cleanse the Right-angle Attachment.—Keep at hand a small wide-mouthed bottle half-full of coal-oil, in which immerse the attachment, running it in there for a minute or so. This attachment becomes clogged by saliva, as well as by resinous oil, both of which the coal-oil loosens and works out. It is better to avoid the cheap resinous oils altogether, and employ the porpoise-jaw oil used by jewellers on clocks.

Diatoric or Pinless Teeth.—The extent to which these teeth as bicuspids and molars have lately been advertised in connection with pin teeth for the incisors and cuspids for full dentures has perhaps tended to create the impression that diatorics will not hold firmly as front teeth. Having used them extensively for over fifteen years I can state the contrary. The only trouble with the diatoric incisors and cuspids is that they do not permit a long bite, for which facings, especially when backed, are admirably adapted.

To prevent fracture of facings, when they are backed and then soldered to a strip of metal, as when facings are used in long bites in plate-work, it is essential that the strip of metal shall project beyond the backing and reach under the end of the facing, so that the tooth may rest on and be supported by said strip, and not by its pins only.

To remove Plaster from Impression-Cup.—Holding the case in your left hand, and with the left index-finger reaching up under the handle of the tray so that its tip supports the end of the handle, tap with the handle of your plaster spatula the handle of the tray. This imparts a jarring upward motion to the body of the tray, which dislodges the plaster.

To make a Counter-Die for Fusible Metal for swaging Caps.—Melt lead in a small semi-globular melting pot, and when it has set but is yet hot invert the pot, turning the lump of lead onto the bench with its rounded side up. Now touch the metal to the lead, and as soon as the former ceases to melt when they are so brought in contact drive the die into the summit of the lead with a heavy blow; immediately remove the die and cool it in water; then repeat the process until the counter-die is formed.

Cotton Fibers in Amalgam.—These come off the end of your

index-finger, when you are using it to rub up the mix of amalgam in the palm of the hand. A little while previously you had rubbed some cotton into a pellet between your finger and thumb, and the fibers had clung to the finger and were thence transferred to the amalgam.

Soap versus Vaselin for Polishing Strips.—Rub your strip two or three times over a cake of dry soap, which you will find is not only less trouble than spreading vaselin on it, but also works better.

A Trick played by an Articulating Frame.—I was exceedingly worried for two or three months by finding that when I had set up the teeth of artificial dentures so that they seemed O. K. in the articulator on removal to the mouth the posterior teeth would not occlude. Sometimes they were as much as one-thirtieth of an inch apart. At last I discovered the cause. I had been using one of those articulating frames which has an arrangement for widening the distance of the two halves, in order to accommodate very thick models. This sliding arrangement is tightened by a screw, but I had allowed the screw to become loose and thought it of no special importance anyway, because the parts held fairly well friction-tight without it. Here was the mistake. In setting-up the posterior teeth, especially the last molars, these teeth acted as a fulcrum when pressure, applied at the front of the frame, was made on them; so that the upper half of the articulator became a lever which when pressed down in front forced up the portion at the back.

To aid retention of a partial lower plate, where some of the anterior natural teeth remain, and especially where the bicuspids are gone, so that there are left no good teeth for clasping, pass a bar of gold around in front, between the lip and membrane, and sufficiently far down to go beneath the protuberance which almost always exists in this region. The bar should be shaped by pliers to the model so that it will fit snugly against the membrane. Its ends are to be anchored in the buccal region of the plate. This is far better than passing a strip of vulcanite around here, being more easily made, more easily cleansed, and less liable to break. By its aid, and with the help of my non-expanding and hard-setting model plaster, which loses its form neither by swelling nor by compression, I am dispensing with clasps for partial lower plates.

A long-shanked bur for the right-angle attachment is often required, as when it is desired to make an undercutting in a cusp for

the retention of a filling, as for instance when the bucco-approximal wall of a lower biscuspid stands firm and undecayed while the linguo-approximal wall has gone. The short-shanked burs which we buy are often too short to reach such a spot at the proper angle. The remedy is simple: Take an ordinary hand-piece bur and file it into a right-angle attachment bur, leaving the shank any length you please. This can be done in a few minutes.—*Brief.*

ANTISEPTICS AND DISINFECTANTS. By Geo. W. Cook, D.D.S., Chicago. Read before the Chicago Dental Society. Since the recognition of the phenomena that fermentation and decomposition or putrefaction of vegetable or animal matter are carried on through the physiological activity of bacteria, and also that certain bacteria are capable of acting in a deleterious manner on the higher animal organisms, thereby causing the well-known phenomena of disease, the attention of investigators has been directed to the finding of a chemical agent capable of inhibiting the development of bacteria, thus rendering substances antiseptic, and also if possible agents capable of destroying bacteria and their spores, thereby rendering substances germ-free or disinfected.

But in this connection it is well that we have a clear idea of the terms antiseptic and disinfectant. While all the chemical substances which have the power of destroying bacteria and their spores are termed disinfectants, it necessarily follows that in weaker solutions they may only inhibit the development of bacteria and thus be termed antiseptics. On the other hand, it does not necessarily follow that all chemical substances which are capable of inhibiting the growth of bacteria, are capable in stronger solutions of destroying them altogether. It is well known that many of the volatile oils and sugar will not permit the growth of bacteria, but no matter how concentrated have no power to destroy bacteria or their spores. Such agents are only antiseptic. In this paper I shall have little to say concerning the true antiseptics, or those chemicals having only the power to inhibit the growth of germs, but wish to speak particularly of chemical substances which in weak solutions have an inhibitory action, and in stronger solutions are disinfectants or render substances germ-free.

More than a century ago experiments were carried on by a distinguished military physician, Pringle, upon the action of disinfect-

ing infectious material. After the investigation of this scientist there was a period in which men were guided only by their sense of smell, and were of the opinion that when a nauseous stench could no longer be detected the cause of the disease had been destroyed. "Unfortunately such a crude empiricism is followed by a large majority of the dental profession of to-day." With such ideas as these before them surgeons made extensive use of substances like lime and sulphate of iron, and the whitewashing of rooms became one of the favorite means of disinfecting.

It may be said that Semmelweiss established the aseptic method of treating wounds by the use of chlorin water, which he also recommended for the cleansing of surgeons' hands. The next substance that was used for the purpose of disinfection was carbolic acid, which was introduced by a French apothecary named Lemaire, and later Lister used this agent for the antiseptic surgical dressing of wounds. This empirical method was practiced until Koch clearly demonstrated the action of chemical agents on both the vegetative and resting stage of bacteria. He at that time thoroughly distinguished between the simple inhibitory action and that of killing bacteria and their spores. It was during this time that corrosive sublimate was proved to be most effective as a disinfectant, and that chlorin was of greater value than carbolic acid.

Koch during his investigation found that anthrax spores would not germinate in nutrient media when in corrosive sublimate, 1:300,000; hydrochloric acid, 1:1700; salicylic acid, 1:1500; potash soap, 1:1000; carbolic acid, 1:850; quinine, 1:625. It required a 2 per cent solution of corrosive sublimate for one hour to destroy the spores of anthrax; a 2 per cent of chlorin water had practically the same effect, while these other substances required many days, and the anthrax spore lived for more than forty days in a 5 per cent carbolic acid solution.

Soon after these investigations by Koch it was recognized that mechanical purification must precede disinfection, consequently acids and alkalies became an important factor in the preliminary preparation of parts for disinfection. Caustic soda, quick-lime, and milk of lime dissolved in water were considered as valuable disinfectants. Acids proved of great value, especially the mineral acids. The organic acids are not nearly so effectual on bacterial life, and especially those acids produced by the physiological activity of bacteria.

The effective action of bichlorid of mercury as a germicide is much diminished in an alkali media containing an albuminous substance, for in such solutions an insoluble albuminate of mercury is formed, unless there is added to the solution sodium chlorid or ammonium chlorid, which cause the formation of an oxid or hydroxid. Following this observation it was found that the true disinfectant properties of carbolic acid were due to the cresol that it contained, and that the crude carbolic had a greater quantity of cresol than the pure carbolic acid. Owing to the fact that crude carbolic is insoluble in water, Hueppe prepared a solution by adding sulphuric acid, forming what he called phenol sulfonic acid, which is very soluble in water. This agent was claimed to have great germicidal properties, but it was found that there was a difference in the action of this agent on the anthrax spore, for in one instance it would destroy the spore while in another it would not.

Laplace made the discovery, however, that there was a difference in the molecular arrangements and that the chemical formula differed, there being two compounds known as the ortho-phenol sulfonic acid and the parra-phenol sulfonic acid. These two chemical agents were found to act very much the same upon the vegetative stage of bacteria, but upon the spores of anthrax the ortho-compound acted much more energetically. The preparation of these two compounds is accomplished by the difference of temperature at which they are mixed. To obtain the ortho-sulfonic acid the crude carbolic and crude sulphuric acid are mixed in a cold place; while the parra-compound can be obtained by heating the ortho-sulfonic acid to body temperature or higher.

Repeated attempts have been made to render the phenols and cresols soluble in water, consequently all sorts of mineral acids and alkalies have been used. Many of the hydrocarbon compounds were found to be more or less soluble in soap solutions; thus we have the well-known agents creolin, sapocarbol and lysol. At first it was thought that these solutions rendered the phenols and cresols more soluble in water and in this way would prove beneficial disinfectants, but with many bacteria they act only as antiseptics.

As has already been stated, the cresols were looked upon as being very proficient disinfectants if they could only be rendered soluble. Sodium salicylicate was likewise combined with cresol, making a compound that acted as a proficient antiseptic but had little value as

a disinfectant. All of these substances must depend upon their antiseptic properties for the cresols they contain, and perhaps the most efficient one is lysol, because it emulsifies fats. A combination of sodium cresol, a preparation known as solutol, is also an alkaline solution which saponifies fats and dissolves proteid bodies; thus combining the cresol for its disinfecting and the sodium for its cleansing properties. In some instances this substance might act as a disinfectant, but it would depend very largely upon the microorganism and the substance in which it was growing. From the agents just mentioned, and the efforts of investigators to render these substances soluble, it would seem that the germicidal properties of an agent depend upon the complexity of the molecular structure and the reactivity of the atom groups in the molecule. Consequently we cannot rely upon any agent that does not readily go into solution.

This brings up the question as to what a solution is. A solution as we understand it at the present time is dividing the atoms in the molecule, thereby making the substance capable of diffusing through animal membrane; thus we see that an agent to act as a chemical disinfectant must be capable of readily going into solution, and in the process of the division of the molecular structure that part of the agent that acts as a protoplasmic poison must pass through the cell wall of bacteria and attack the proteid molecule. We here recognize at once the possibility of such an agent acting more deleteriously upon the cell of man and other animals than upon the bacterial cell, because of the organic structure of the cell wall, and the different organs and tissues of both the higher animal and plant life.

At the present time it is thoroughly understood that the bacterial cell wall is a far greater resistant to osmotic pressure than is the cell wall of the multi-cellular organism, or even some of the very low forms of the alga and many of the low forms of the protozo, like the ameba. We recognize at once the almost seeming impossibility of obtaining a biological disinfectant or one that we could even say was a biological antiseptic. What we mean here is that an agent would act upon the cell structure of the bacterial cell instead of the cell of the multi-cellular organism. Many of the agents named act very energetically upon the vegetative stage of bacteria, while the spores of many forms of microorganisms will live for an indefinite period in many agents that are now being used for their

disinfectant properties. For instance, we might mention the hydrocarbons of the aromatic or benzine series (C_nH_{2n+2}). The commonest constituents are terpenes, having a general formula of ($C_{n+}H_{2n+2}$, + or C_5H_{10}). There are some twelve of these terpenes, all having this general formula, but differing in their sterometrical forms or optical activities. While some of these oils contain only terpenes, many of them contain in addition some oxidized aromatic substances, as the phenols, ketones, aldehyd acids, etc. The oils containing oxygen are not so volatile as the pure hydrocarbons. As has already been mentioned, to obtain the chemical antiseptic properties of an agent it must readily go into solution; therefore such substances as the hydrocarbon compounds cannot be considered other than antiseptics to spore-forming bacteria, and possibly disinfectants to the vegetative stage of the microorganisms. Cushny has stated that their antiseptic properties are doubtlessly due to the volatility of the agents, acting only as a foreign substance, but there is a class of substances somewhat closely allied to the above-named agents. This is the chinoline series and aromatic series (carbolic acid and salicylic acid series). The greater number of this series is obtained from the coal or wood tar.

Coal or wood tar preparations from which cresol and phenol are derivatives, the cresol, guaiacol and other less poisonous aromatic compounds, are present in greater quantities than the phenols and dioxol benzols; the three cresols are nearly related to the carbolic acid chemically. The meta-cresol is less poisonous to mammalia and less irritating, but much more destructive to microorganisms than carbolic acid. The parra-cresol is the most powerful of all. These substances are only slightly soluble in water; therefore there has been some difficulty in rendering them available as antiseptics. This has been partially overcome by forming an emulsion with the coal tar oil containing considerable hydrocarbons and a little phenol, mixing with soap and diluting with water. As has already been stated, this is the so-called creolin. While on the other hand, we take the tar containing little hydrocarbon and more phenol, in combination with soap, diluted with water, and we get the sapocarbol and lysol. These are evidently not preparations of cresol. Recently there have been brought out three isomeric cresols. Only one of these will be spoken of here—the tri-cresol. This substance is soluble in water two and one-half per cent. It is not nearly so

poisonous as the other agents spoken of, but is an active protoplasmic poison to the microorganic cell. It proved to be antiseptic 1 in 300, and caused death of the germs in five minutes.

Thymol is another homologue to carbolic acid, the formula of which is $C_6H_3C_3H_7CH_3OH$. This comes from the common thyme and several other plants, forms in large colorless crystals, and is very soluble in water. While this agent seemingly has never attracted much attention as a general antiseptic, still in my experiments it proved to have much greater antiseptic powers than carbolic acid.

Guaiaquin is a chemical substance prepared by treating pure crystalline guaiacol with concentrated sulphuric acid. The agent is composed of 44.26 per cent of quinin combined with 55.74 per cent of guaiacol sulphonic acid. This is a yellow acid salt, very soluble in water and alcohol, and possessing the formula $C_6H_4O_2CH_3HSO_3$ or $C_2OH_{24}N_{202}$. This acid was antiseptic to 1 to 300, and caused death in five minutes.

Chinosol is another agent that proved to be very markedly antiseptic and caused death in about three minutes exposure. Chemical formula $C_9H_6NK_{32}$. So far as I can learn, Kleb was the first to place the antiseptic value on this agent that it evidently deserves. It seems to answer every purpose as an antiseptic in dental use. I placed in five teeth that had previously been soaked in bouillon twenty-four hours a mixed culture of staphylococcus, hay bacillus and bacillus prodigiosus. They were then rolled in moist, sterilized cotton and placed in the incubator for six, ten and twenty-four hours. They were then taken out and treated with chinosol, ten per cent, three minutes in each tooth. The tooth which had been left in the incubator twenty-four hours gave a culture of hay bacillus, but all the other teeth were found sterile.

These last two named agents are non-irritating to the tissue under ordinary circumstances. This shows the possibilities of obtaining a true chemical disinfectant. I have called attention to such agents as proved most beneficial as disinfectants and seemed to have but little irritating properties in the experiments carried on by Dr. MaWhinney and myself.—*Review.*

VARIATIONS IN THE DEVELOPMENT AND DENSITY OF TOOTH TISSUE. By J. Taft, M.D., D.D.S. Read before the Southwestern Michigan Dental Society, April 8, 1903. This caption

implies that there is a diversity in the density of the teeth of different persons, and in the same person at different periods of life, and indeed apparently under nearly uniform environment, but much more is this apparent in the ever-varying vicissitudes to which humanity is subjected.

Doubtless heredity, which is the transmission of physical and mental conditions, defects and peculiarities, from one generation to another, has much to do in the production of defective structure of the teeth of mankind. Variations in this transmission often occur because of dissimilarities between progenitors. How often is it that parents are unlike in physical make-up, and this is shown in their teeth as pronouncedly as in any other tissue. If the teeth of both parents are alike defective those of the offspring may be equally so, and are often worse, or one parent may have good and the other defective teeth, and the offspring may then partake of the quality of one or of the other. The results that sometimes occur under such circumstances are very peculiar and striking indeed. Further on this line I would suggest that the subject of heredity is worthy of more attention, study and investigation than has generally been given to it, especially in regard to the teeth.

That the teeth vary so much in their density is shown in a number of ways. The close observer in his daily work will have ample evidence of variations in density that obtain in the teeth of different persons, and in the same person at different periods of life. In the normal, uninterrupted growth and development of the teeth up to twenty-five or thirty years of age they increase in hardness, and in some instances even five to ten years beyond this. In all cases the permanent teeth are easily cut with the excavator or drill for five or ten years after eruption; this is true even of the better varieties of teeth. The readiness with which some fracture under percussion or blows from a hammer, or from gradual pressure, as in a vise, when compared with those of firmer texture, shows a radical difference in solidity and firmness.

The examination of the sections of teeth with the microscope shows a condition of tooth structure quite divergent from the normal. The varieties that appear in the hard tissues of the teeth are shown in the enamel rods, in the defective calcification, rendering them less dense than normal. In the well-formed enamel the rods converge to a central point in the crown of the tooth, but in the defective enamel

this convergence does not obtain, but a divergence to a greater or less extent is present. Furthermore, the union of the rods is much less firm in the defective teeth. There is quite a variety in the surfaces of enamel—in some it presents a smooth and highly-polished surface, while in others there is a more or less pronounced want of the bright and glistening appearance seen in the more perfect teeth; indeed, they sometimes have a rough and corroded surface. The canals in the normal dentin, like the enamel rods, converge to a common center in the crown of the tooth, but a perfect arrangement of them is quite exceptional. They are frequently many degrees out of proper inclination and much more curved than normal. In some cases the canals are greater in number in a given area than normal, while in other instances they are less in number, so precluding the formation of perfect tissues. This abnormality consists in part at least of irregularity in the arrangement of the canals through the dentin, and defective adjustment of the enamel rods.

There are often found in the dentin defective areas where there is imperfect calcification and a deficiency in the proper supply of canals; these areas are called interglobular spaces, and when attacked by decay go very rapidly. The dentin and enamel are made up of organic and inorganic material; the former first takes on organic form and arrangement, in other words, the odontoblasts and net-work that constitute the matrix in which the lime salts are deposited are arranged in accord with the typical form for normal dentin. It should be kept in mind that in these developing processes interruptions may and often do occur; these interruptions vary greatly in degree and extent. These interruptions or defective areas are sometimes very limited, affecting only a mere spot, and in others much greater, involving in some cases the entire body of the dentin and of the enamel as well. The following are some of the conditions under the influences of which these defects occur:

Faulty Nutrition. This may occur from an insufficiency of food, or from inappropriate food, or its improper preparation. In illustration of this statement it may be said that a large proportion of our bread supply is in its preparation almost wholly deprived of its bone-making material. The lime salts are by the bolting process removed with the brans, the starch and gluten being retained, these constituting the flour of which ninety per cent of our bread is made, but with which it is impossible to make the most nutritious bread. The ques-

tion of the presence of lime salts in food is a very important one, one with which those who prepare our food should be thoroughly familiar, and especially is this true of those who prepare food for the supply of infantile life. Another very important question is the character of the food supply which the mother receives during the period of lactation. Those who have given close attention to the subject inform us that few mothers afford the children in infancy food supplied with bone phosphate in sufficient quantity to meet the demands of the growing bone structures of the body, and especially of the teeth. This occurs of course because of an insufficient supply of proper food by the mother.

In this respect there is a very common deficiency, indeed, in many instances the bony tissues of the child are literally starved by this privation. The child is not the only sufferer in this direction, as the welfare of the mother is jeopardized as well. Nor are these things the only points of danger. The digestive function of either the mother or child or both may be defective, and if of the mother only it is impossible that she can afford proper nutrition for her child. The digestion of the mother may be good, but that of the child faulty, when the processes of digestion and assimilation will be defective, and then faulty structures will necessarily be made. Good hygienic conditions must be afforded to both mother and child, if the growing and developing processes are to bring about strong and normal tissues.

All the conditions above named may be perfect, and yet disease of some form or other may step in and interrupt or destroy the processes of development and growth more or less persistently. We will not attempt in this paper to discuss these further than to say that any and all diseases of the general system which are inimical especially to the proper organization and growth of the structures of the body will apply to the teeth. Affections of the skin and mucous membrane of the mouth and alimentary canal, such as measles, scarlatina, small-pox, diphtheria, stomatitis and other dermal affections, are most injurious to growing teeth, and are very likely to injure the teeth during the time of their calcification.

These few suggestions may give us some intimation as to what should be done if we would secure the best bony tissues, applying these principles to the teeth as well as to other hard structures. Oftentimes local affections spring up in the mouth and its adjacent

parts that are injurious to the growing teeth. The development of the organic structures of the teeth is a very intricate and delicate process. The formation of the odontoblasts may be easily impaired, and these organs being defective a perfectly-developed structure is impossible. Even when these are well formed and properly developed, failure to secure good calcification may occur from a faulty condition of the lime salts while in the plasm, or from a want of energy in the calcifying process, namely, the precipitation and arrangement of the inorganic material in the matrix already prepared for it. For perfection in this work a certain balance is indispensable to secure the best results. Considering all these things, may we not begin to understand how easy it is for faulty structures to be made, and how many embarrassments stand in the way of structural perfection?

In addition to the inferences that may be drawn from the above considerations, I will venture for the remainder of this paper to draw upon the experience and observations of a few noted practitioners, who have had large experience in treatment for securing good bone tissue and especially that for the teeth. These quotations have reference mainly to supplying the material requisite for building bone tissue by the artificial administration of lime salts in the form of bone phosphate. The use of bone phosphates for securing good dental tissue apparently receives less attention now than in former years. It is, however, largely used by physicians in the form of phosphate syrups for the various general affections, especially those of the nervous system, and of the lungs and other vital and functional organs.

It is stated in Championniere's Journal of Pract. Med. and Surg. that "Dr. Lavau of Birac called the attention of the Academy of Medicine of Paris to the importance of sulphuret of lime in the regeneration of bony substance. He observed more than twenty years ago that this agent diluted in olive oil and used in frictions to destroy itch induces enlargement of the joints of the fingers. This observation led him to prescribe frictions with sulphuret of lime on the head of rickety subjects whose fontanelles were excessively large or persisted beyond the normal period, and he obtained with surprising rapidity the ossification and obliteration of these membranous apertures. He therefore surmises that the same treatment may perhaps be also applicable to the secretion of the periosteum in the

great process of the reproduction of bone." If such is the case this agent might prove useful in promoting the deposit of dentin over exposed and sensitive pulps.

In the course of a very interesting paper on the medical properties of the alkaline hypophosphites Mr. Jno. Taylor speaks thus of their relation with dentition: "The impulsive demand for tribasic phosphate of lime in the construction of the teeth contributes to the disturbing influence called the fever of dentition; and this disturbance is often found to be most pyrexial in children that have been ill fed, or that have been too long suckled, both instances showing the want of a due proportion of phosphates. In the robust there is sympathetic spinal irritation, tending to convulsion; in the feeble and cachectic, sympathetic nausea and purging, wearing out existence. In both forms I have given hypophosphites of potash with marked success; in the first or asthenic form with solution of acetate of ammonia and syrup of rhubarb; in the latter with acacia and some tonic or aromatic tincture. It is delightful to witness the consolatory effect upon a fractious, pseudo-inflammatory child, some cases of minor intensity being cured by the first effort, say eight grains of the hypophosphites in a two-ounce mixture. Those of the asthenic form had considerable dyspnea, cough, pale dry skin, and a feeble pulse; some requiring ammonia as an adjunct, others not, but in all the impressive power of the hypophosphites, with its appropriate adjunct, was most satisfactory—frequently simple syrup or mucilage sufficed.

The absence of phosphate of lime in mother's milk a cause of infant mortality. The *Courrier* of Paris, in a very able article on the mortality of infants, attributes it in a great many instances to the insufficiency of the development of bone, and adds that the milk of a healthy nurse ought to contain two and one-half grams of phosphate of lime, which is the basis of all osseous matter. From observations made it appears that scarcely one in ten women has milk coming up to this standard, and therefore the infants, it is said, necessarily perish or grow up sickly and probably deformed.

Phosphate of lime, its assimilation and therapeutical employment. "We notice (*Lancet*) in Le Mouvement Medical (No. 17) a summary of a recent published memoir of Dusart et Blanche, who have made a number of experiments upon animals and men to ascertain the action of the gastric juice upon phosphate of lime. They find that much of the phosphate of lime of commerce is nothing more

than carbonate of lime, and to this cause they attribute the varying experiences of different observers. They have found that the hydrated phosphate of lime, recently precipitated, is the most suitable for assimilation, and in their experiments they employed the lactophosphate of lime, the ultimate result of the action of gastric juice upon phosphate of lime. They made some experiments on Guinea pigs, in whom they produced fractures, and they found that the increase of weight of the bones of such of the animals as were submitted to the action of the phosphate of lime exceeded that of others placed under ordinary regimen more than thirty-three per cent, though all the animals were given exactly the same quantity of aliment. They administer two grains of the lactophosphate of lime to the ounce of syrup daily in soup. Dr. Perate has found this lactophosphate of lime extremely beneficial in dyspepsia from insufficient secretion of the acid of the gastric juice.

"For a long time past the calcareous salts have been employed in medicine. The numerous experiments of Chossat, who established in a vigorous manner the fact that certain animals did not find in their ordinary food sufficient mineral substance for the reparation of losses of osseous structure, have increased considerably the uses of these agents. It is evident, in fact, that in order for the physiological equilibrium to be maintained alimentation must be completed by addition of calcareous material to keep up the solidity of the skeleton and to prevent the bones from becoming fragile.

"In cases of rickets and osteomalacia Bouchut prescribed phosphate of lime in quantities of from two to five grams in the day. Piorry gave this agent to children in doses varying from five to ten grams, it having been reduced to an impalpable powder and mixed with a soft substance as cream or marmalade. In many cases this physician served the phosphate of lime with iodid of potassium. Guersant and many others prescribe eight to ten small pastilles to be taken every day, each containing three centigrams of lactate of iron and five centigrams of phosphate of lime. In their observations on men and the lower animals Gosselin and A. Milne-Edwards made out that in cases of fracture the necessary time for consolidation was notably shortened after the administration of phosphate of lime with the food.

"A book has lately been published in Paris by M. Dusart on the physiological and therapeutical properties of phosphate of lime. The

author maintains, after numerous experiments in the animal kingdom, that this salt is the natural exciting agent in the functions of nutrition; that it induces the albuminoid matter to assume the cellular shape, and that it controls the formation of tissues. In short, according to M. Dusart, phosphate of lime is eminently an agent of nutrition. This view holds good, also, in respect of the vegetable kingdom, and the author asserts that the salt in question is concentrated in the leaf-bud, but is almost absent from the fully-developed leaf, so as to become concentrated in the seed preparing for the ultimate development of the embryo. M. Dusart points out that the phosphate of lime is always conjoined with nitrogenous matter in plants, and that the relative proportion of the salt and the nitrogen is always identical wherever they are found. In animals the same phenomena take place, and when they are made to feed much upon the phosphate they absorb more food, and increase rapidly in weight, owing to the transformation of the albuminoid matter contained in the food into muscular fiber."

Cases Cited.—Mr. J., aged twenty-two, sanguino-bilious temperament. Has twenty-eight permanent teeth erupted. They are full sized, well formed in shape, good color, and thoroughly calcified for his age, with perfect blending of enamel caps, and no sign of decay about them. An older brother has a perfect denture in every respect. There are other brothers and sisters who are said to have as good teeth as these which I have examined. The father and mother of this family have hardly any teeth left in their mouths. They have been decayed many years; consequently these children would inherit poor teeth. Now for the hygiene which prevented that calamity. During the infancy of some of the children, and before the two brothers, of whose teeth I have particularly spoken, were born, the parents moved to a new state in the West and were very thankful to get their wheat ground into meal for bread, as in the first settlement no bolts were put in the mills. A taste for unbolted bread was acquired which has continued to the present day, and no fine flour has ever been used in the family excepting on extra occasions. The family have always enjoyed remarkably good health, which they attribute to their bread diet. Noticing a slight furrow across the labial surface of Mr. J's upper central incisor, I remarked that he must have had a fit of sickness when between two and three years old. He said he did not know but would ask his mother. His mother

confirmed my conjecture, saying that he was sick about six weeks at the age named.

Miss H., aged twenty, has erupted twenty-eight teeth, nearly all decayed. The teeth have a pearly tint and are badly calcified; the sound dentin cuts easily. I remarked that her teeth looked as though she lived on fine flour bread and butter, and she laughingly said, "That is the only kind of food I desire; I do live on it." She informed me that all her sisters had good teeth compared with hers; that they ate meat, potatoes, milk, etc., and that they laughed at her for her "old maid way of living."

Miss G., lymphatic temperament, aged thirteen. Has twenty-eight permanent teeth, pearly tint. The fissures in the crowns of the molars and bicuspids are decayed, as are also many of the proximal surfaces. The teeth cut soft and indicate maldentification. I filled fourteen cavities in them. The father of this girl is a miller, and the family uses the finest of flour. This girl was nursed on milk made from fine flour, and her teeth were starved for the want of phosphate of lime.

The greatest mischief ensues to the teeth when the phosphate of lime is denied to the embryo infant. It does not replenish the blood of the mother with this substance, as it naturally occurs in the food, and the forming teeth of the child must inevitably suffer and the mother's also. When we reflect on the large quantity of lime salts necessary to build up the bony tissues of a child until it is eighteen months old, and the waste of the same material which is daily excreted from the body of the mother and child, we may cease to wonder at the universal decay of teeth in Americans, and smother the sacrilegious inquiry, "Why did not the Creator make the teeth to last as long as the rest of the body?" There is no need of relating more cases. I could do so by the score, for I have inquired of many people in regard to their habits of life in relation to the teeth, and the story is nearly always the same.—*Register.*

ELECTROLYTIC MIGRATION OF REMEDIAL AGENTS. By H. L. Banzhaf, D.D.S., Milwaukee. It may safely be asserted without fear of contradiction that cataphoresis, wherever its use is indicated, does relieve pain, and particularly the kind of pain dentists are called upon to inflict. Candor nevertheless compels me to admit that until quite recently this method of producing anesthesia of the

pulp and tooth structure was unpopular with a great many good operators. A change of sentiment, however, has come over the professional mind within the last year or two, and this change in favor of cataphoresis is without doubt the direct result of the work of some of our most scientific and earnest thinkers along this particular line—notable among them Dr. Weston A. Price.

The question, "Why have there been so many failures?" is naturally asked. Time forbids a detailed answer to this question, but briefly stated the cause of failure may be found in one of the following reasons: First—A lack of thorough knowledge of the principles involved in electro-therapeutics and electro-chemistry. Second—Defective apparatus. Third—Imperfect insulation. Fourth—Faulty application of the current. The subject is too vast to treat adequately in this limited discussion. I will therefore confine myself more or less rigidly to the first reason enumerated, and endeavor to state briefly the accepted theory of cataphoresis, an understanding of which I believe is necessary for an intelligent study of the subject.

Types of Conductors. In considering electrical conductors we find first of all that they are divided into two classes, depending upon their chemical behavior in the passage of the electric current, namely—Conductors of the first class, or metallic conductors, which are not chemically decomposed by the passage of the current. Metals and carbon belong to this class. Conductors of the second class, which carry the current with simultaneous decomposition. To this class belong the salts, bases and acids, fused or in aqueous solution. Substances which conduct electricity in this manner are called "electrolytes," and this kind of conductivity is called "electrolytic conductivity" in contrast to the metallic conductivity of the first class of conductors.

Formation of Ions. The process of decomposing electrolytes chemically by passing an electric current through them is called "electrolysis." The primary action of the electric current on the electrolyte is that the molecule of the dissolved substance is split into two parts. These primary decomposition products are called the ions. For example: if an electric current passes through a solution of salt (NaCl) the molecule of the salt is decomposed into two ions, sodium and chlorin. One of the ions is attracted by the positive pole, moves towards the same, and is therefore charged negatively. The other ion is attracted by the negative pole and is therefore

charged positively, because opposite electrifications produce attraction.

The electrolytic decomposition of the salt can be demonstrated by the following equation: NaCl equals N+a+C—l. Hence by the electrolytical conduct of a solution all molecules of the dissolved substance are gradually split into positive and negative ions, which move through the liquid to the opposite pole. This motion of the ions toward the opposite pole is called migration of ions. The liberated ions are set free at the attracting pole, either as such, or they may undergo secondary chemical processes by being further broken down chemically or by uniting chemically with the solvent. Later experiments have shown that the decomposition of chemicals into ions is not only produced by passing an electric current through them, but it has been demonstrated to a certainty that many chemicals when dissolved in water are broken down. The conclusion that water has the property of decomposing these chemicals when they are dissolved in it in an analogous manner to electricity was first suggested by Arrhenius in 1887 and shortly afterwards by Plauk. This theory has been adopted as the base of our modern view in regard to aqueous solutions, and is called the Arrhenius theory.

Hydrolytical Dissociation. The decomposition of substances when dissolved in water is called hydrolytical dissociation, but it must be borne in mind that not all substances soluble in water are hydrolytically dissociated. For example, sugar dissolved in water does not undergo hydrolytical dissociation. By comparing the substances which undergo hydrolytical dissociation with those which undergo electrolytical dissociation we find that both are identical; both are obeying the same laws. The molecules of an electrolyte when dissolved in water are broken down to positive and negative ions; hence when salt is dissolved in water the solution contains positive sodium ions and negative chlorin ions. It is therefore reasonable to conclude that both kinds of dissociation are in reality the same.

The hydrolytical dissociation of a substance by being dissolved in water does not take place in all molecules at once, but increases with the quantity of water which is added, and is theoretically complete only when the quantity of water added is infinitely larger in comparison with the quantity of the substance dissolved. Therefore, if a very dilute solution of the electrolyte which is almost completely

dissociated into ions is evaporated the ions are gradually reunited, and this process is completed when all the water is evaporated.

Action of Current. According to the foregoing statements, the process of an electric current passing through an aqueous solution of an electrolyte can be explained as follows: The aqueous solution of the electrolyte is split by hydrolytical dissociation into two kinds of ions, some being charged with positive and the other with negative electricity. If then the poles of an electric battery are dipped into the solution the migration of the ions commences, the positive ions moving to the negative pole and the negative ions to the positive pole, where they are set free as such or undergo secondary chemical changes.

The animal body, as everyone knows, is also a conductor of electricity, but the conductivity of the animal tissue is not of a metallic but of an electrolytical nature, every cell of the body being filled by an aqueous liquid which contains substances (salts, etc.) dissolved.

Osmosis. Now if we place the two poles of an electric battery on two different parts of the body and pass an electric current through it, it is evident that the same process first described will take place; the electrolytes split into ions which commence to migrate through the body until the positive ions reach the negative pole and the negative ions reach the positive pole. It therefore becomes at once apparent that in doing so the ions are obliged to pass through the cell walls, when migrating from one cell to another, and such motion of dissolved particles through a porous membrane is called osmosis. Hence in order to migrate to the opposite poles the ions must undergo osmotic processes by passing through the cell walls when moving from one cell to the other.

In order to demonstrate the migration of ions through animal tissue anilin dyes can be used to advantage, for the reason that they can be easily observed during their migration on account of the intensity of their coloring action. These dyes are salt-like compounds, the coloring part of which is sometimes the acid (as in eosin) and sometimes the basic radical (as in methylene blue). An aqueous solution of the first class of anilin dyes contains the color as negative ions, that of the second class contains the color as positive ions.

In further proof of this theory, suppose we make the following experiment with methylene blue, which is the chlorid of a coloring base. By dissolving it in water it breaks down into ions, the negative

chlorin ions being colorless and the positive being methylene blue ions. We place the negative pole of an electric battery somewhere on the body, while the positive pole is dipped in the solution in which also a finger is dipped. The negative chlorin ions will at once commence to migrate to the positive pole which is in the liquid, while the coloring positive ions migrate to the negative pole, but in doing so they must pass through the cell walls of the finger and by osmosis from cell to cell the nearest way to the negative pole.

Cocain Hydrochlorate. This migration of the ions will result in colored spots and lines where the current passes through. The action of cocain hydrochlorate in producing anesthesia of the pulp and dentin is similarly explained. The negative pole is applied to the body and the positive pole to the cavity properly insulated containing a solution of cocain. The cocain is the positive ion, and as the current is applied the migration of the cocain ions in the direction of the negative pole immediately takes place. The action of salicylic acid, lithium, iodid of potassium, etc., when their electrolytical migration is desired is explained in precisely the same manner.

Summary. The migration of ions through animal tissue by the aid of an electric current is called the ion cataphoresis, and consists of three processes: First—The hydrolytical dissociation of the salt by its solution in water, whence positive and negative ions are formed. Second—The migration of the ions caused by the attraction of the opposite poles. Third—Osmosis which takes place through the walls of the cells.

Anyone can thus see from the foregoing that it is not necessary to be an electrician, as is often supposed, in order to intelligently and successfully practice this method for the control of pain, and it must also be quite apparent that when a reasonable effort is made to understand the underlying principles involved its comprehension is comparatively simple.—*Items.*

IMPORTANCE OF ATTENTION TO THE MOUTH AND TEETH BEFORE AND AFTER OPERATIONS UPON THE PELVIC VISCERA. MacNaughton-Jones in the *Medical Press* writes of the importance of oral cleanliness prior to pelvic operations. As he well says, anything that is likely to complicate recovery from a pelvic or abdominal operation is worthy of attention. This may appear a truism, yet it is unfortunately the fact that occasion-

ally we have to deplore a fatal result which arises, not from some apprehended cause such as unavoidable surgical calamity or complication, but from a trivial oversight or unlooked-for accident or complication which greater forethought or watchfulness might have prevented. It is to the occurrence of such a sequel to a pelvic operation that the author briefly draws attention.

It is well known that even in health a great variety of microorganisms are found in the buccal cavity, such as the leptothrix sarcinæ spirilla, the pneumococcus of Friedlander, the bacterium gingivæ pyogenes, the bacterium termo, the pseudo-diphtheritic bacillus, and less frequently the staphylococcus albus and aureus, the streptococcus pyogenes, and the bacillus coli communis. This is only part of a list of microorganisms which, according to Miller, frequently number a hundred and forty million in an unclean mouth. Fortunately, the old saying is true of all these deleterious organisms—"these fleas have other fleas"—and to this microbial cannibalism we owe the immunity from septic influences under ordinary conditions rather than to the weak bactericidal effects of the saliva. But we must further remember that these microbes may secrete ferments and produce alkaloids, the same microbe possibly having the property of producing both, and toxic ptomaines also be formed from these pathogenic organisms. How far the swallowing of such infective germs, if they be not destroyed by the gastric secretion and reach the intestines, infecting the intestinal tract, indirectly favors septic changes in wounded tissues, especially in those in close proximity to the bowel, we cannot say. That they may and occasionally do appears to be certain. That they must directly cause various gastric troubles is equally true. When the general health is affected, and the buccal cavity is itself involved by an acute or chronic constitutional disorder, the virulence of such organisms is increased. By disordered states of the stomach, the naso-pharyngeal tract, the teeth, tongue, and buccal mucous membrane, this increase in virulence is likely to be produced. The mouth then becomes a generating microbial incubator, in which fermentative, putrefactive and infective action is rife. The bacterium termo, which we have noticed as being present, is known to be one of the most active agents in bringing about putrefactive changes. The affection pyorrhea alveolaris, in which a pus pocket forms between the alveolus and the root of the tooth, and which is attended by softening with purulent exudation

from beneath the gum, is commonly known to all dental surgeons.

In a valuable series of articles which appeared in the *Clinical Journal* Mr. Fitzgerald discussed the etiology, pathology and treatment of this affection. Among the predisposing causes, besides syphilis, tuberculosis and scurvy, he mentions the exhaustion of acute infectious disease, or any other source of malnutrition. The gingivitis is accompanied by streptococcus invasion and putrefactive organisms, with decayed food remnants, which with the associated pus are swallowed, and act locally on the stomach wall, originate gastric fermentation, and initiate processes which are the result of the absorbed toxins generated in the mouth.

A woman under the author's care for recto-vaginal fistula, which was cured by operation, and on whom he subsequently performed amputation of the cervix, consulted him on different occasions for most severe ulcerations of the buccal mucous membrane and the inside of the lips and tongue. Pseudo-diphtheritic patches, extending deeply into the tissue and very difficult to heal, recurred from time to time, notwithstanding that the teeth had been attended to and all carious stumps removed. He had ordered two or three bacteriological examinations made of scrapings from the membranous exudations, and each time the staphylococcus and streptococcus were present with other organisms. Recently, though she has been for a few years free from an invasion, she has had another and milder attack on the inside of the lip. At the time of the first attack the sockets of all the incisor teeth were infected; these were attended to by her dentist and peroxid of hydrogen was injected.

The lymphatics of the salivary glands, and those of the mouth communicating with the superficial and deep cervical glands, may carry infective organisms to these latter. Should there at the time be any slight abrasion of the buccal mucous membrane, the infection may thus directly reach the circulation.—*Therapeutic Gazette.*

ANTHROPOLOGICAL SPECULATIONS. By J. Sim Wallace, M.D., D.Sc., L.D.S., London. The special study of one branch of science often modifies our opinions on correlated branches. So even the study of the irregularities of the teeth tends to make us modify our ideas on certain criteria upon which anthropologists lay much stress, and make us doubt if they are of the importance they are wont to attach to them.

To me, at least, it seems probable that many of the causes of the irregularities of the teeth are similar to the causes which account for the changes in the jaws and associated parts as we ascend from anthropoid apes, through primitive man, to the existing types of the present day. We have referred to numerous characteristics which are generally supposed to be racial and inherent. These on analysis are found to be largely the *results* of different habits necessitated by the different stages of civilization to which the particular race has attained, together with the concomitant differences which tradition, climate and general environment have impressed upon essentially similar hereditary potentialities. As an example of this may be taken the prognathism of the negro. It is said (Talbot) that this characteristic is not nearly so pronounced in the negro of America as in his African ancestor—that, in fact, he has in the course of a few generations become more or less orthognathous. It is ridiculous to contend that he has become an hereditary racial type differing from his relations in Africa, for if he were thrown back into the state of civilization in which he originally existed his descendants would at once return to the same type from which he originally sprang. Now it is contended by anthropologists that gnathism is one of the most important (inherent) racial characteristics as marking the stage of evolution to which any particular branch of the human family has progressed, while in reality I am convinced it is more correct to say that orthognathism is the result of a civilized environment, and only to a small extent the result of hereditary racial characters.

No doubt, however, characters which are changed or adapted to changed environment produce concomitant modifications, and by giving rise to modifications throw the established relations into strained relations, which in their turn may predispose to disease and premature death. Thus natural selection steps in and ultimately modifies the hereditary structure, or in the words of Mr. Lloyd Morgan, natural selection "would work along the lines laid down for it in adaptive modification. Modification would lead, variation follow in its wake."

Another example is furnished by the narrow and prominent nose of the highly civilized. In this case we have the prominence, due *partly* to the lack of anterior development of the maxillæ, and to the lack of development along the suture separating in the maxillæ. The only exception to the fact that platyrhinism is associated with

and roughly proportional to the amount of mastication is the case of the Esquimaux. This may be accounted for by some influence of the extremely cold air which they breathe, or by some other atmospheric condition associated with their methods of ventilating their houses, although it is also probable that there is some relationship between cranial development and capacity and leptorhinism.

It is possible, too, that a special characteristic of the semitic race, which by the way is by no means universal among them, comes about from similar causes. Their method of speech too often suggests nasal stenosis. The reason that such defects are more prevalent among them is no doubt due to the fact that they are essentially town dwellers, and they more frequently fall a prey to the bad environment. Of course I do not contend that Jews have not any hereditary racial characters, but only that what is generally supposed to be their chief one is probably in many cases to a great extent rather the result of their environment.

Another example may be mentioned. In certain races the outer canthus of the eye is tilted upwards. From casual observation I believe that this is a characteristic even among well-developed English children. The usual depressed canthus is as a rule more pronounced in narrow-faced and thin people, and no doubt this feature, which is by no means as merry looking as the raised outer canthus, might seldom exist among us if we had been fed on foods which necessitated mastication and supplied the body with its physiological requisites.

Another speculation which seems to offer ground for consideration is the effect of the upright posture in bringing about a diminution in size of the jaw. There is a marked difference in the size of the jaws of the higher apes and those of the aboriginal Australians, and yet their food may not be so very different as regards its physical qualities. It seems possible that the drag on the hyoid, produced by the erect position, may largely account for the diminution in size. It should also be remembered that the anthropoid apes make much more use of their arms than do any men. Thus the muscles of the trunk and neck are much more fully developed, and prevent any undue drag on the hyoid. The normal relations would no doubt be maintained among children if they were allowed or encouraged to play their own little games, frequently involving a more or less horizontal position. This society will not permit, and even though

it sacrifices the health of the children it would be considered ridiculous to advocate games which might dirty the knees or wear holes in trousers. It is rather more in keeping with modern civilization to drill in erect and strained positions or to sit bolt upright working with books or "behaving." Still, the day may come when the phylogeny of the race may be considered in relation to the ontogeny of the individual.

Another speculation seems worth recording. Much importance has been put by transmissionists on the fact that the teeth and jaws have become relatively small in man, and especially civilized man. For they contend that the weight of the jaws could hardly be considered of sufficient survival value to have been subject to the effect of natural selection. Leaving other objections to this idea aside, I would here call attention only to one neglected consideration. Perhaps man was descended from a small anthropoid. (Dr. Campbell informs me that man very probably *was* derived from a small anthropoid.) Now if man has been derived from a smaller form it follows that natural selection, not acting particularly on the jaws and teeth, acted in such a way as to increase the size of certain other parts specially subservient to the upright posture. But if the skull and other parts increased in size, then without any change in size the jaws and teeth became relatively smaller.—*Record.*

LYMPH GLANDS IN RELATION TO THE TEETH AND GUMS. By George Morgan, F.R.C.S., Eng. Nature, always kind and considerate up to a certain point, has anticipated man's neglect by entrenching around the jaw a series of lymph glands, not inaptly described as "Nature's first line of defense." By the title of my paper I have committed myself to a larger subject than I had intended. It is to the lymph glands of the cervical and submaxillary group that I wish to confine my remarks. These are under our immediate observation, and any variation in their size and motility can be noted without difficulty. What is true of the glands and the jaw is true in a lesser degree in the case of the glands of the intestinal tract. A large part of the foul discharge of the rotting teeth is swallowed and the mesenteric glands have to deal with it, and according to Dr. W. Hunter, only in an imperfect way are they able to. The microorganisms with which the discharges are laden are to a certain extent

destroyed, but the toxins themselves enter the blood stream, causing serious blood and nerve diseases.

Anatomy.—Lymph glands are found only in birds and mammals; in fishes, reptiles and amphibians the thymus performs their function. Their two-fold function is—(1) The formation of leucocytes. They enable these cells to multiply according to the demand of the part in which the adenoid tissue is situated. (2) They protect the circulation from the entrance of microorganisms, chiefly from skin and the mucous membrane, in the tissues generally. Normally they do not permit the passage of microorganisms into the blood, but if the germs are of a particularly virulent character the glands offer no resistance to their passage. Given the entrance of microorganisms into the skin or mucous membrane, a temporarily enlarged gland may be a sign of a protective reaction, while its absence may be a very untoward sign.

The glands immediately affected by teeth and gums are certain groups of the face and neck. To briefly name them there are—(1) *The Suprahyoid Glands.*—A small group of three or four glands lying in and between the anterior bellies of the digastric muscles. They drain the anterior part of the lower gum and lips and pass the lymph on to the next group.

(2) *Submaxillary* group, which are said by text-books to number from eight to twelve, but either actually or potentially they may be numbered by scores instead of ones. The number in text-books applies only to the primary glands, which when destroyed or removed are replaced in function by *secondary* glands, and even these may be followed by *tertiary glands,* measuring before hypertrophy takes place not more than 1 or 2 millimeters in diameter. They are situated in the digastric triangle running along the edge of the lower jaw. Twice I have seen one of these glands, slightly enlarged from dental caries, so firmly cemented to the periosteum of the lower jaw that it appeared to be an exostosis and was sent to the hospital as a case of that disease. They drain the lower gum and lips, the floor of the mouth, the sublingual and the submaxillary glands. They empty their lymph partly into the superficial, and partly into the deep cervical glands.

(3) *A small* group of glands which more than once has provided us with an interesting case at the hospital is the internal maxillary or deep facial. Their presence is apt to be forgotten. Even when

suppuration comes on, at first the signs are masked, and it is only when the glands burst and the suppuration is rapidly increased behind and around the tonsil that dangerous symptoms arise. The glands are said to be from three to six in number, and are situated by the side of the pharynx immediately posterior to the buccinator muscles. It is into these glands chiefly that the upper teeth and gum drain.

(4) *The superficial cervical* glands are few in number. They are situated along the course of the external jugular vein between the platysma and deep fascia; they receive some lymph from the posterior part of the gum, but they chiefly drain the scalp and skin of the neck.

(5) *The deep cervical* group, by far the most extensive, follows the course of the interior jugular vein. The upper group extends from the base of the skull to the thyroid cartilage. Besides draining the interior of the cranium, the various muscles, they receive lymph indirectly through the submaxillary glands from the gums.

The lower set of deep cervical extends from the thyroid cartilage to the clavicle, and all the lymph from the head and neck passes through the glands into the thoracic duct on the left side and the right lymphatic duct on the right side.

Pathology.—The list of microorganisms that have been found thriving in and around decaying teeth is sufficiently startling to make a nervous man desire to sterilize his teeth before each meal. I shall refer only to the practical question as to how far these germs found in the pulps of carious teeth are responsible for serious trouble in the glands. In an inquiry of this kind the questions at once face us: (1) Do teeth possess lymphatics; (2) have they the power of absorbing liquids containing microorganisms and passing them into the glands? It is a fact that lymphatic vessels in the pulp have not been traced microscopically. Dr. Korner Halle of Berlin tried by Gerota's method, *i. e.*, by means of an injection of Prussian blue into the tissues of the pulp, to see if he could trace lymphatic capillaries or vessels in the pulp. A whole net of vessels and capillary veins could be seen, but they were blood-vessels. The result of these experiments is that there are no embryonal lymphatic vessels or spaces in the living pulp. That would seem to settle question 2: Can the pulps of living or dead teeth absorb and pass on microorganisms to the glands? It would seem to give an emphatic denial to that possibility However, a further set of experiments proved conclusively that though there are no lymphatic vessels to carry these bacilli to the

glands, microorganisms certainly can find the way along this channel. It may be by way of the intracellular stream of liquids in the tissues, or possibly the wandering cells themselves carry them to the glands. Dr. Halle proved that particles of Prussian blue could find their way from the pulp to the gland. He experimented on dogs by laying bare the pulp, painting in Prussian blue, and closing the cavity with cement. Two or three days after the dog was killed and the pulp of the teeth as well as the submaxillary gland examined by the microscope. Some particles of the Prussian blue were found through the whole pulp up to the apex of the root and also in the lymph glands.

In the light of these experiments what other conclusion can be drawn but that it is possible for microorganisms to find a ready passage from the pulp of carious teeth to the nearest gland? A natural question to ask here is—Has the conclusion been confirmed by observation in clinical work? Undoubtedly it has. I admit there was a time when my mind was not so fully made up on this point. I felt the danger of carious teeth in relation to lymph glands had been exaggerated. It was the natural conclusion to draw from the practice of the Brighton Children's Hospital. Any surgeon seeing a corresponding number of patients at a London hospital would not see quite the same material and would not therefore draw the same conclusions. At the Brighton Hospital there is a much larger percentage of children drawn from the surrounding villages; children living in better air, and as a rule having better food, and therefore whose lymphatic system is not nearly so vulnerable as town children with a worse environment. I have seen hundreds of children in the last seventeen years with badly decayed teeth, and yet not having a trace of enlarged glands. But these are children who live in a healthy environment and who come from a fairly healthy stock. Even in these children the freedom from injury to the glands is only apparent, it is not real. A gland constantly irritated by microorganisms from a carious tooth is potentially weaker; it is more vulnerable than a gland not so irritated. That greater susceptibility to injury is shown by the effect of strain on such glands. I think we may take it for granted that a gland becoming tender and remaining for some weeks enlarged from simple strain is not a healthy gland. Its resisting power has been lowered by having to deal with microorganisms, perhaps in no great amount but spread over long periods.

Frequently I have seen cases illustrating this rule. A girl, aged 8, coming of a very healthy family, and living in a good house, slipped while using dumb-bells and strained the muscle of her neck. The next day there were two tender glands a little in front of the right angle of the jaw. The lower first molar on this side was badly decayed and had been so for a year, yet until the strain there was no sign of enlarged or tender glands. After the strain the glands remained enlarged for several months, and one finally became tubercular.

Glands in the groin will sometimes enlarge from the strain of foot-ball, but careful examination of the area of drainage and going into past history will nearly always prove that the glands were not in their normal state at the time of the injury. Measles and whooping-cough often play the same *rôle* as strain, *i. e.*, glands injured by decaying teeth, and yet not visibly showing any change, will enlarge more quickly and remain enlarged longer than glands not so injured. I am of course speaking here specially of glands draining the teeth and gums. I could supplement these cases by others proving that strain alone does not cause inflammatory enlargement of healthy glands.

I should be glad to learn if carious teeth are more common on one side of the jaw than the other. It is a fact that tubercular glands and gland abscesses are nearly twice as frequent on the right side as on the left. I find the cases under my care for the last thirteen years work out as follows: Right side of the neck, 50 per cent; left side, 27 per cent; both sides, 14 per cent; at lymphatics, 9 per cent. Strain on account of use of right side may have a predisposing influence in determining the larger number on the right side. As regards the vicious influence of carious teeth on the glands of children of tubercular tendencies, of generally feeble children, or of children living in an unhealthy environment, there cannot be the slightest doubt, and I have been surprised that in cases of tubercular glands too frequently the cause is neglected and the whole attention turned to the effect. One would have thought the only logical plan in these cases would be in the first place to remove as far as possible the cause, to stop the supply of tubercle bacilli or other micro-organisms by way of the decaying teeth, and then try to reduce the inflammatory thickening caused by the ravages.

The above observations apply to carious teeth firmly fixed in the

jaw, surrounded by a healthy gum, where absorption has been through the pulp. I pass now to a far greater danger than a carious tooth, viz., a loose tooth, especially a loose carious tooth or stump. Here well-marked changes take place in the surrounding gum. One might illustrate what takes place by the effect of a simple collar on the skin of the neck. The constant friction of a roughened surface rubs into the skin the staphylococci or streptococci that may be on the skin and so causes boils or carbuncles. An incised wound in the same position infected by the same germs has not the same effect. It is a number of slight injuries, frequently repeated, that produces the soil most favorable for germ growth. The frequently repeated irritation of a sharp stump, or the stem of a tobacco pipe, is a far more potent cause of epithelioma of lips or tongue than an incised wound of these organs. Is it not the pin pricks, frequently repeated, that fret and worry a man and finally break his spirit, and what is a leucocyte, whether fixed or wandering, but a personality in miniature? Here in the case of a loose rotting stump or tooth we have every factor potent for the production of an infective lesion. The worrying of the gum by constant friction, portions of food undergoing putrefactive changes lying between the gum and the teeth, and the spot bathed in fluids teeming with microscopic life—this is soil-preparing and seed-sowing to perfection. Under such influences the gums become more cellular in structure, and the blood and lymph stream becomes slower. The tubercle bacillus and other microorganisms finding their way to the glands through tissues of this kind are much more active than those passing *via* the pulp of a carious tooth.

Upper and Lower Teeth Compared.—There can be no doubt that the *lower gum and teeth* are far more frequently the cause of suppurating and enlarged glands than are the upper. According to the text-books the lymph from the upper gum, teeth and palate drains into the internal maxillary or deep facial glands. Lesions of these glands are exceedingly rare; unless they suppurate they cannot be diagnosed, and even after suppuration they may easily be overlooked, unless the abscess enlarges and pressure symptoms supervene. I suppose the upper teeth decay at the same rate as the lower, and yet lesions of glands are certainly a hundred times more frequent from the lower than the upper. In twelve years there have not been twelve cases of suppuration of the glands admitted to the Children's

Hospital. I have a suspicion that some of these cases die undiagnosed or certified as quinsy, yet making all allowance for unrecognized cases the lower are infinitely more common. The only suggestion I can give of the remarkable predominance of lesions in the glands of the lower jaw is that the glands representing the upper jaw are less exposed to the vicissitudes of temperature and strain than are the lower.

Influence of Inflamed Gum Over Unerupted Teeth.—This as a cause of gland trouble in infants is not to be too lightly thought of. In a weakly infant I have often seen a gland remain enlarged and finally suppurate from this cause. I leave it to you to decide what effect an incision into an inflamed and turgid gum will have on the teeth, but I am fully convinced that a timely prick in such a case may save future troubles, as tubercular or suppurating glands. A not unnatural question to occur here is, How do the bacilli get to the glands when there is no breach in the mucous membrane? That is not necessary when the resisting power of the gums is lessened by inflammation, any more than it is in the case of the bacillus coli communis, which causes infection without any actual breach in the intestinal wall.

Lesions Found in the Glands from Teeth.—Goadby and others working on the mycology of the mouth give a long list of microorganisms found therein. I am not aware that many of these germs have ever been traced in the glands themselves. Clinically the glands found in connection with teeth can be divided into three classes, which I shall simply enumerate without fully describing. (1) *The largest class* is the tubercular. The gland in this case may finally caseate, suppurate, or become fibrous, and in this latter case remain for years. I have in my possession a gland that remained forty-four years after teeth which caused the trouble had been removed; it is one of the most interesting gland cases I have seen. (2) *Acute Suppuration of Gland.*—This class, acute suppurative adenitis, is not very common. The abscess forms in a few hours or days and bursts or is opened. It is not the suppuration of a previously tubercular gland, that is common enough. (3) *Chronically enlarged glands* other than tubercular.

In conclusion, a word about *actinomycoses.* Considering the fact that the actinomyces most frequently find an entrance to the system through a carious tooth or through the gum, one would expect to

find the glands affected. The actinomyces are often found in the root canal of the affected tooth, thence spreading to the jaw, sometimes simulating osteo-sarcoma. When the case arrives at this stage the glands will be slightly enlarged, but from the effect of suppuration, not from the ray fungus itself. The disease does not extend by the lymphatic system, and although the glands may be slightly enlarged no growth of actinomyces has ever been found in them.—*British Dental Journal.*

TREATMENT OF THE DECIDUOUS MOLARS. By C. N. Johnson, L.D.S., D.D.S., Chicago. Read before the Second District Dental Society of the State of New York, January, 1903. The chief problem in the care of the deciduous teeth, and the maintenance of perfect comfort in mastication till the permanent teeth are erupted, relates to the proper management of the deciduous molars when they have become decayed. The deciduous incisors are usually lost and replaced by permanent ones at least five or six years before the molars are shed, and those years are sometimes very trying both to patient and practitioner. It is becoming quite generally recognized in the profession, and in fact to a large extent among our patients, that it is a matter of great importance to keep the deciduous teeth well cared for till they are lost by natural processes.

Evils of Faulty Mastication. Aside from the resultant pain induced by exposed pulps and acute alveolar abscesses, and the constant absorption of pus into the system from chronic abscesses, there is another train of evils following neglect of the deciduous molars which is even more far-reaching in its effect than either of these. This relates to the habits of mastication formed during youth as influenced by the condition of the deciduous teeth. If a deciduous molar is allowed to decay to any depth it naturally becomes sensitive to the impact of food. It takes the little patient but an instant to recognize the fact that to bite on that tooth results in discomfort, and a few twinges following the attempt to masticate on this particular side of the mouth are sufficient to relegate all of the food to the opposite side. Unilateral mastication does not subserve the full functional activity which nature intended in the proper management of the food by the teeth in its preparation for the stomach. More particularly is this the case in the mouths of children, where the total area of mastication is not very great, and where any reduction of this

area proves serious. But worse than this, if a molar on either side of the mouth becomes involved—as is frequently the case—there is a very material crippling of the process of mastication, and the patient, not having arrived at years of accountability, has only one resource—the avoidance of mastication. Mastication hurts, and the only way to keep from being hurt is not to masticate. The result of all this is the child begins bolting the food without chewing it, and the ultimate effect is to form a habit which may last through life.

If we study carefully the methods of mastication among adults we find that there is a great variation in the thoroughness with which this function is performed—even among those who have relatively the same masticating equipment. If two individuals having equally good teeth show a striking variation in mastication, it must be due wholly to habit, and it is only reasonable to suppose that this habit is formed for the most part during youth. It will thus be seen that even apart from any consideration of the patient's present comfort and health, the maintenance of the deciduous molars in a condition of normal serviceability is a matter of very great importance.

In considering the care of these teeth it may be well to study separately the different classes of cavities and the different conditions manifested during the progress of the disease. In doing this no attempt will be made to take up a certain phase of the subject which, though having a very intimate bearing on the management of children's teeth, is of a character unsuited for presentation before a body of experienced practitioners. This relates to the control of the patient, the study of temperament as it affects the handling of these cases, and the general comity between patient and practitioner which enables the latter to carry out his work to the best advantage. All of this is something for each individual to study for himself, and it simply resolves itself into one of the chief requisites for the successful practice of dentistry in any of its departments, namely, an intimate knowledge of human nature.

Small Occlusal Cavities. Taking up the technical procedures of the work then, the first class of cavities to be considered will be small occlusal cavities. The control of this class of decay is usually not a very serious matter, and yet it is important that these cavities be given the closest attention. The direct impact of food on the occlusal surface renders a cavity in this region especially susceptible to

discomfort during mastication, and it should therefore receive adequate protection. Probably the most serviceable filling material for these cavities is amalgam, though there are some cases in which, on account of the sensitiveness of the cavity or nervousness of the patient, no metal filling can be successfully used. It is of course not necessary to form cavities with the same degree of thoroughness demanded of operations on the permanent teeth, and yet if we use amalgam we must at least remove the decay. To do this in some cases is difficult, particularly when the cavity has long been exposed to the fluids of the mouth and is exceedingly sensitive. To place oxyphosphate of zinc over a mass of decay and leave it for any time is hazardous, while to insert it temporarily with the idea of substituting it with something else in a few weeks after the sensitiveness is relieved involves the difficulty of removing it. The best plan of procedure in these sensitive cases is to flood the cavity well with one of the essential oils, and then pack it with gutta-percha for a week or ten days. Usually at the end of this time the gutta-percha may readily be removed and the decay taken out with little discomfort. Pink base-plate gutta-percha is best for this purpose, but in case the tooth is so sensitive that it cannot tolerate the heat and pressure necessary to manipulate the base-plate, some of the softer temporary stoppings requiring little heat to soften them may be used.

The only preparation the cavity needs for filling aside from the removal of the decay is to break down thin enamel walls which overhang the cavity and make reasonably strong margins. In doing this hand instruments are usually preferable to the engine, though in certain cases a bur may be used to advantage if the patient is not too much frightened by it. In breaking down thin enamel around an occlusal cavity great care should be exercised not to allow the chisel to impinge against the interior of the cavity. This is usually very painful and unnerves the child. The best means of doing this work is with a very short-bladed hatchet or hoe excavator, the shank of which will impinge against the outer surface of the tooth as each piece is cleaved away and thus prevent the blade from coming against the sensitive tissues in the cavity.

Small Proximo-Occlusal Cavities. The fact that the crowns of these teeth are very short renders it impossible to admit of much decay on the proximal surface without involving the occlusal surface, so we are seldom called upon to prepare simple proximal cavi-

ties. The operator is fortunate if he catches the case shortly after the occlusal wall is broken in and before the pulp is involved. If only one tooth is decayed the problem of filling is simplified, but when the contiguous surfaces of both molars are gone it becomes vastly more complicated. In case there is only one cavity to deal with and the pulp is not involved the most serviceable material to use is amalgam, but where the pulp is too close to admit of a metal filling, the choice must be between gutta-percha and cement. These materials are temporary in their nature, but there is this advantage in gutta-percha over cement—that when it fails it is not deceptive in its method of failure as is sometimes cement. Gutta-percha wears away on the exposed surface more rapidly than cement, but it seldom admits of a pronounced excavation under the filling. With cement we may find a filling badly undermined at the gingival margin even to the point of pulp exposure while from the occlusal aspect the filling appears in good condition. But on the other hand there are some of these cavities of such a form that gutta-percha will not remain in them, and so sensitive that they cannot be formed to retain it. In these cases cement may be made to do service by virtue of its adhesive properties, and the difficulty at least tided over temporarily till the tooth is in a condition to accept more permanent work.

In cases where both molars are involved and the cavities face each other, a very serious complication at once manifests itself. If we restore the original contour of the tooth with the limited anchorage which we are usually able to get in these sensitive cases, we are liable to have the fillings loosened by the tipping stress exerted in mastication; and if we do not contour we at once subject the patient to all the annoyance and pain of having food wedged between the teeth into the interproximal space. This matter of the wedging of food between the deciduous molars is really responsible for much of the complaint made by children during mastication, and to overcome this difficulty is one of the chief problems presented to us. In some very persistent cases it seems impossible of accomplishment, short of bridging across from one tooth to the other in a solid mass of filling. This method has serious objections and should be resorted to only in those desperate cases where nothing else promises relief. When it is attempted the filling should be preceded by a small flat metal guard laid across the interproximal space over the gum, rest-

ing one end on the gingival wall of one cavity and the other on the gingival wall of the other. Over this the filling may be built with the utmost assurance that the gum will be perfectly protected against injury and the teeth made comfortable. These metal guards may be cut from thin clasp metal or german silver, and before being placed in position a small bit of gutta-percha may be stuck to each end and warmed so that when the guard is pressed against the gingival wall of the cavity the gutta-percha will seal the space between the guard and the cavity.

As to the kind of filling material to be used in this bridging process we are practically confined to two—gutta-percha and amalgam. Cement is almost worthless for this purpose. It is so rigid that it will not in the least accommodate itself to the individual movement of the teeth during mastication as will gutta-percha, and it is not sufficiently strong to hold firm when pressure is brought to bear upon one tooth and not on the other. The consequence is that in a very short time we find it loosened from one of the cavities and frequently from both. The same difficulty arises, though in a less degree, with amalgam. But amalgam is much stronger than cement, and if we can get deep anchorage for it in both cavities it is the best material for this purpose, with the one limitation that it will sometimes remain secure for an appreciable time. Gutta-percha wears away rapidly and calls for periodical renewal. But meanwhile the teeth are kept comfortable for mastication, which is an important consideration, and it would seem preferable in desperate cases to see the patient every two or three months and renew the gutta-percha rather than resort to methods which so often prove disastrous.

In cases where the cavities are filled without bridging, it is always best if amalgam is used to fill one cavity at one sitting and the other at a subsequent one. This admits of giving the proper contour to the first filling and so rounding out the contact point and polishing it after it has become hard that the second filling may be conveniently built against it and trimmed to the best advantage. If this is attempted with both fillings at once while the amalgam is soft, it usually results in imperfect contact or in an appreciable space between the fillings.

Pulp Exposures. When a pulp becomes exposed in one of the deciduous molars the problem arises as to how it shall best be

treated. Usually these pulps are not very tenacious of life and so are not susceptible to treatment for their preservation. And yet it would seem undesirable, in view of all the conditions surrounding the case, to make an application of anything so powerful as arsenic to destroy a pulp in a deciduous tooth. The distance from the point of exposure to the apical foramen is not very great, and the vascularity in these young tissues is more pronounced than in adult life, so there is always the possibility of the effects of the arsenic being carried beyond the tooth into the apical space. This is especially true if absorption of the end of the root has begun preparatory to the admission of the permanent tooth. Added to this is the difficulty of securing perfect sealing of the agent in these young mouths where the control of the patient is usually not so certain as with adults, and where the area between the point of exposure and the gingival margin of the cavity is exceedingly limited. If an exposure occurred in an occlusal cavity and the pulp were very troublesome and persistent of life, there might be some justification for applying a minute quantity of arsenic, but these conditions so seldom arise that it may be stated as a safe rule never to apply arsenic to a deciduous tooth. The seriousness of the effects of arsenic when carried beyond the apex in children's teeth may easily become very great, and the necessities of the case do not ordinarily call for so evident a risk. As has been stated, these pulps do not die hard, and if given a reasonable chance they will ordinarily disintegrate of their own accord. The problem is merely to keep them comfortable during this process, and this can usually be done in the following manner:

When an exposed and inflamed pulp is brought for treatment, the first procedure is to syringe out the cavity with warm water and remove all of the debris and decalcified dentin with an excavator. This may readily be done in these cases with almost no pain if the operator is careful not to touch the pulp. After the cavity is cleaned as perfectly as possible, it is usually best to slightly puncture the pulp with a fine explorer to induce a free flow of blood. This may cause momentary pain, but subsequent relief is thereby assured. When the pulp begins to bleed, warm water should be gently syringed into the cavity till the bleeding ceases, by which time the tooth will usually be comfortable.

Make a paste of oil of cloves and the powder supplied with our oxyphosphate of zinc, and gently pat it over the exposure and seal the cavity carefully with gutta-percha. A pulp treated in this way will remain comfortable till it dies, and the first indication of death is a slight soreness in the tooth on pressure. Instruction should therefore be given to bring the little patient to the office on the first symptom of soreness, when the gutta-percha may be removed and the canals treated in the usual way. Of course, there is occasionally the possibility of the case being neglected, as other cases often are, till an abscess starts, but this is a contingency for which the dentist is not responsible, and usually if an abscess does begin it can readily be relieved by opening the cavity to give it vent, syringing it out well with warm water and applying an antiseptic.

Pulpless Deciduous Molars. The treatment of pulpless deciduous teeth is little different in plan from that of permanent teeth with the exception of two features of the case which need mention. A deciduous tooth, the canals of which have been exposed for any length of time to the fluids of the mouth, seems to become more extensively saturated with the products of decomposition than a permanent tooth under similar conditions. There is nothing viler ever tolerated in the human mouth than a long-exposed putrescent deciduous molar. It taints the breath of the little patient, and the first stirring up of the contents of such a tooth usually permeates the air of the operating room for some distance. In addition to this there is ordinarily greater difficulty in securing a perfect mechanical and medicinal cleansing of the cavity and canals in a child than in an adult on account of the limitations under which the operator must work. It is not often possible to apply the rubber dam, and the problem of excluding fluids of the mouth during the treatment of the case is difficult. In view of these conditions it is frequently necessary to extend the treatment over a greater length of time, and to change the medicaments oftener than usual in order to overcome the putrescence and render the tooth fit to receive the filling.

In cases of abscess with fistulous opening, if the fistula does not heal after the canals seem in good condition and medicine has been forced through the fistula once or twice, sometimes a very effective method is to flood the canals with a solution of gutta-percha in eucalyptol and pump this through the fistula, following it immedi-

ately with a solid gutta-percha root filling. The reason for not doing this in the first instance is because these putrescent cases should be kept under the influence of an antiseptic for at least a week before attempting to fill the roots. If the canals have been made aseptic, the fistula will usually heal, following the passage of the eucalyptol solution.

In discussing pulpless deciduous teeth there is one brief reference which would seem desirable before closing the subject. The question has sometimes arisen as to the effect of the loss of the pulp on the process of root absorption preparatory to the eruption of the permanent teeth, and the statement has been made that roots would not be absorbed if the pulps were destroyed. This is a manifest error, as has been amply demonstrated by the exhibition of deciduous crowns which have toppled out with the roots completely absorbed and the gutta-percha root fillings still clinging to the crowns. But it is a different matter if the teeth are allowed to remain in the mouth badly abscessed. With the ends of the roots constantly bathed in pus the normal process of absorption cannot be expected to go on, and this is only one additional argument why diseased deciduous molars should be restored to a condition of health.—*Items.*

MENTHOL PRELIMINARY TO ANESTHESIA.—Mentholization of the mucosa of the air-passages before, during, and after etherization, has given Dr. W. A. Briggs (*American Medicine*) such satisfaction as to impel him to submit the method to the profession at large. The method is as follows: Sprinkle a dram of oil of peppermint or of saturated alcoholic solution of menthol in the cone; let the patient inhale of this freely for three minutes, then saturate the cone with ether and bring it down slowly over the face; after a few full inhalations crowd the cone down well and push the etherization as rapidly as is consistent with safety; continue the use of mentholized cone through the whole period of anesthesia, replenishing the ether as usual. After the operation let the patient inhale oil of peppermint or menthol from a handkerchief freely and often until the tendency to nausea subsides. The advantages over the usual method are as follows: 1. Entire freedom from cough and sense of impending suffocation, and comparative freedom from nausea, vomiting and retching. 2. Ease and rapidity with which anesthesia may be induced, and ease and smoothness with which it may be maintained. 3. Entire absence or marked abbreviation of the period of excitement. 4. Economy of ether and of time occupied. 5. Profounder initial anesthesia, under which minor operations may be done with more certainty. 6. Probably less post-operative nausea and vomiting.

The Dental Digest.

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Where All Communications Should be Addressed.

Editorial.

THE PASSING OF A GREAT MAN.

We are called upon to record the death of Dr. Jonathan Taft, one of the pioneers of our profession and one who has done as much if not more for the upbuilding and advancement of dentistry than any other one man. His service to his profession was not alone in educational and literary work, but also in the influence of his personal character. A man of strong will power, he was nevertheless always ready to make concessions and defer to the wishes and judgment of others where principle was not involved. Although lame and forced to use a cane nearly all his life, and never strong nor in good health, he was ever cheerful and full of sympathy and encouragement for others. His genial greeting and hearty handshake were a benediction. No one could come in contact with him without being benefited. His friends were legion and his enemies few, if any. He was well called the Grand Old Man of Dentistry.

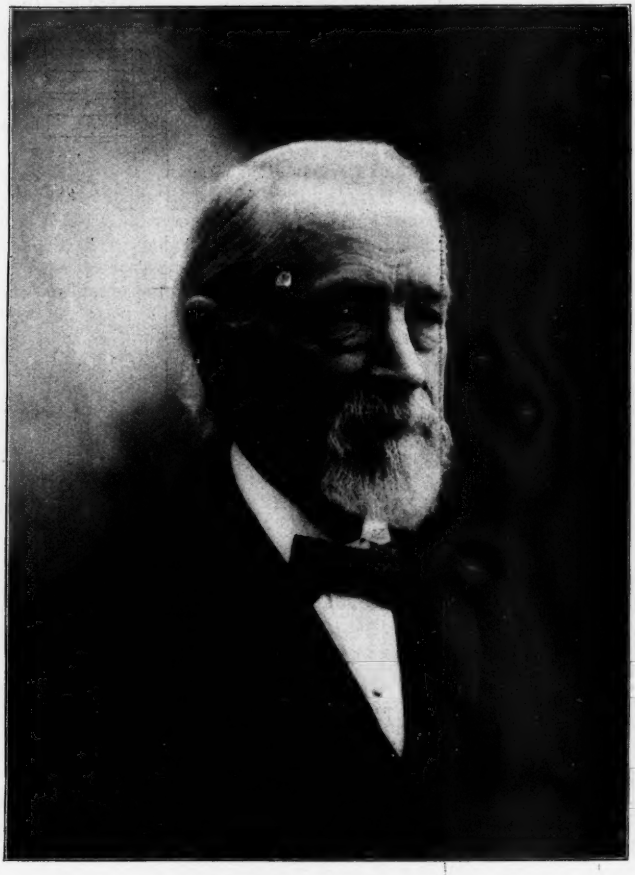
The giants of our profession are fast dropping out, and the question arises, will their places be filled by the present or future generations of dentists? The men entering practice to-day are perhaps better educated, and they certainly have better opportunities for perfecting themselves in all branches. The danger is, however, especially in this age of commercialism, that they will lose sight of the ideals towards which they should struggle, because things are made so easy for them. The men of to-day are quite as strong morally and intellectually as those of any previous generation, but the same opportunities for development of character are not present. In the early days the struggle necessary not only for advancement and knowledge, but for a bare existence, of necessity developed the dental practitioner, but to-day his path is made easy, and if he is to attain the heights the pioneers reached he must be something more than a merely successful and capable operator. No young man to-day has the same opportunity for pioneer work as had Dr. Taft, but each can emulate his character, and strive in his own way to do his full duty by himself, his profession and his patients.

Obituary.

JONATHAN TAFT, M. D., D. D. S.

Jonathan Taft was born Sept. 17, 1820, in Russellville, Brown County, Ohio. He was educated in the common schools and a small academy in Brown County. General U. S. Grant was a student in the academy at the same time. His father, Lyman Taft, was a farmer, a native of Massachusetts, and moved to Ohio in 1818. An injury which was not properly treated resulted in permanently crippling the young man, so that he prepared himself to teach school, which he did successfully for about four years. In 1841 he took up the study of dentistry and began its practice in 1843. He continued in regular and successful practice until about two years ago, when he gave up his office in Cincinnati and moved to Ann Arbor, making a continuous service of nearly sixty years, a record seldom equalled in any profession. In 1850 he graduated from the Ohio College of Dental Surgery, and four years later he was called to the professorship of Operative Dentistry in that school. He filled this chair honorably for twenty-five years, and resigned it in 1879 that he might give his time more fully to the work which he had assumed in the dental department of the University of Michigan. He was for many years dean of the Ohio Dental College, and as this was the second dental school organized in the world, his work was largely of a pioneer nature. At that time there were no text-books on the subject which he taught, and in 1859 he wrote the first work ever published which was exclusively devoted to operative dentistry. This book was the standard work on this subject for more than twenty-five years. In 1856 he became associated with Dr. George Watt of Xenia, O., in the publication of the *Dental Register*, which for ten years had been edited and published by Dr. James Taylor of Cincinnati. This was again pioneer work, as there were then only two other dental journals published. He continued the publication of this journal, in spite of many adverse conditions, to January, 1900, without the lapse of a single issue.

At the time when Dr. Taft was taking on these arduous duties his health was so precarious that his friends predicted an early breakdown, but his will power predominated, and he not only took on more and more public professional work, but his private practice increased so rapidly that he soon had the most lucrative in Cincinnati, which furnished him the means to engage in every movement of national or local character calculated to promote the interests of his profession. Dr. Taft, with a few other noble men of those early days, conceived the idea of making his calling an honored profession, and he made heroic sacrifices to accomplish this end through his writings and assistance in organizing local and national conventions for the open discussion of the technical and scientific problems involevd in dental practice, which in those days were considered trade secrets. He was a member of every important dental society, and probably attended and participated in more meetings than any other one man. He valued highly this method of education and willingly made great sacrifices to encourage it, not alone for



JONATHAN TAFT, M. D., D. D. S.

his own sake but that the profession might be liberalized and given that impetus which has made its development phenomenal. Because of his interest in this movement he contributed largely to the proceedings of these conventions in papers and discussions. He was a forcible speaker and took an active part in all the great issues which have from time to time threatened the higher professional ideals and standards.

His work as an educator became so generally and favorably known that when the regents of the University of Michigan decided to add a department of dentistry he was considered the most desirable man to be intrusted

with so important an undertaking, and at the urgent call of the regents, and against the judgment and earnest advice of his friends, he decided to sacrifice pecuniary advantages in Cincinnati and give a considerable portion of his time to the work. His belief was that with the facilities of a great university a dental education of broad character would be possible, and he was willing to make the personal sacrifice necessary to realize this ideal. The first session was held the winter of 1875-76, and he was made dean of the department and accepted the professorship of principles and practice of operative dentistry. The idea constantly in his mind was to raise the standard of dental education, and he succeeded well.

As a scientific worker he did not make as great attainments as other men who devoted their energies entirely to this field, but he kept up with every advance made in the scientific as well as the technical departments of the profession, and by suggestion, counsel and sympathy he inspired and encouraged many men to carry forward researches for the advancement of dental knowledge. He had many qualities which fitted him for such work, but circumstances prevented him from engaging in it.

In 1842 Dr. Taft was married to Hannah Collins of Ripley, O., who died in 1888. Two sons and one daughter are now living.

Dr. Taft died at midnight, Oct. 15, 1903, at Ann Arbor, after a short illness, death being due to cerebral hemorrhage. He was actively at work until three days previous to his death. He was buried at Spring Grove Cemetery in Cincinnati, Oct. 18.

Notices.

PENNSYLVANIA BOARD OF DENTAL EXAMINERS.

Examinations will be conducted by the Pennsylvania State Board of Dental Examiners simultaneously in Philadelphia and Pittsburg, Dec. 15-18, 1903. For application papers or any information address Hon. Isaac B. Brown, Secy. Dental Council, Harrisburg, Pa.

AMERICAN SOCIETY OF ORTHODONTISTS.

The annual meeting of the American Society of Orthodontists will begin Thursday, Dec. 31, 1903, instead of Wednesday, Dec. 30, as previously announced. The meeting will be held at the Iroquois Hotel in Buffalo, N. Y., and a most interesting program has been prepared.

ANNA HOPKINS, Secy., St. Louis.

UTAH STATE DENTAL ASSOCIATION.

At a meeting held in Salt Lake City, Oct. 8, 1903, the Utah State Dental Association, which has been slumbering for some time, was revived. The day was given over to papers and clinics and in the evening the Salt Lake dentists banqueted their visiting brethren, at which time fifteen new members were enrolled. The following officers were elected: Pres., W. G. Dal-

rymple, Ogden; 1st V.-P., G. F. Stiehl, Salt Lake City; 2d V.-P., J. W. Parsal, Salt Lake City; Secy. and Treas., S. W. Wherry, Ogden.

S. W. WHERRY, Secy.

NORTHEASTERN DENTAL ASSOCIATION.

The ninth annual meeting of the Northeastern Dental Association was held at Boston, Oct. 21-23, 1903, and the following officers were elected: Pres., Henry McManus, Hartford, Conn.; 1st V.-P., T. J. Barrett, Worcester, Mass.; 2d V.-P., Thos. Mound, Rutland, Vt.; Secy., E. O. Kinsman, Cambridge, Mass.; Asst. Secy., C. F. Kreppel, Boston; Treas., E. B. Griffith, Bridgeport, Conn.; Librarian, C. H. Riggs, Hartford, Conn.; Editor, D. W. Johnston, New Haven, Conn.

COLORADO STATE BOARD OF DENTAL EXAMINERS.

The next regular meeting of the Colorado State Board of Dental Examiners will be held at the Capitol in Denver, beginning Tuesday, December 1, 1903. All applications for examination must be filed with the secretary before that date. Examinations are theoretical and practical, and applicants must be prepared to do such practical work as required. For further particulars address

M. S. FRASER, Secy., 407 Mack Blk., Denver.

RESOLUTIONS ON DEATH OF DR. TAFT BY FRATERNAL DENTAL SOCIETY OF ST. LOUIS.

Whereas, After a long and useful career of sixty years as practitioner, author, journalist and teacher Death has ended Life's work of Professor Jonathan Taft, who was universally loved and respected by the dental profession for his scholarly attainments and high ethical standing;

Whereas, In the death of Dr. Taft our profession has lost an advanced thinker and an able and enthusiastic exponent of the best in dental surgery, be it

Resolved, That the Fraternal Dental Society of St. Louis extends its sincere sympathy to Mrs. Taft in her bereavement, which is the bereavement of the whole profession, and expresses its high regard for the worth and character of this pioneer, who so ably exemplified the highest ideal of American dentistry.

Unanimously adopted October 20, 1903.

W. L. WHIPPLE, Pres. pro tem.
E. E. HAVERSTICK, Secy.

INTERSTATE DENTAL FRATERNITY.

At the annual meeting of the Interstate Dental Fraternity, held at Asheville, N. C., July 29, 1903, the following officers were elected for the ensuing year: National Secretary, R. M. Sanger, East Orange, N. J.; National Treasurer, Chas. A. Meeker, Newark, N. J. Vice-Presidents—Arkansas, C.

Richardson, Fayetteville; California, H. P. Carlton, San Francisco; Connecticut, James McManus, Hartford; Dis. of Col., Emory A. Bryant, Washington; Illinois, Hart J. Goslee, Chicago; Indiana, George E. Hunt, Indianapolis; Kansas, G. A. Esterly, Lawrence; Louisiana, Edmund C. Kells, Jr., New Orleans; Maryland, B. Holly Smith, Baltimore; Massachusetts, John F. Dowsley, Boston; Missouri, B. L. Thorpe, St. Louis; New Jersey, Chas. S. Stockton, Newark; New York, F. C. Walker, Brooklyn; North Carolina, J. A. Gorman, Asheville; Ohio, Henry Barnes, Cleveland; Pennsylvania, I. N. Broomell, Philadelphia; Rhode Island, Dennis F. Keefe, Providence; Wisconsin, H. L. Banzhaf, Milwaukee.

R. M. SANGER, Secy.

INSTITUTE OF DENTAL PEDAGOGICS.

Program of the meeting to be held in Buffalo, December 28-30, 1903, at the Iroquois Hotel. All interested in education and the elevation of the standards of the dental colleges and students are earnestly requested to attend this meeting.

1. President's Address. Some Faults of the Prevailing Dental Training. Dr. J. D. Patterson, Kansas City. Discussion to be opened by Dr. John I. Hart, New York, Dr. B. Holly Smith, Baltimore, Dr. H. P. Carlton, San Francisco, Dr. Geo. E. Hunt, Indianapolis.
2. Prosthesis. Two papers. 1. Methods of Teaching the Artistic Elements of Prosthetic Dentistry. Dr. A. O. Hunt, Omaha, Neb. 2. Methods of Teaching the Anatomical Arrangement of Teeth. Dr. B. J. Cigrand, Chicago. Discussion to be opened by Dr. N. S. Hoff, Ann Arbor, Dr. G. H. Wilson, Cleveland, Dr. R. R. Freeman, Nashville, Dr. F. H. Berry, Milwaukee.
3. An Ideal in Pathology. Paper by Dr. D. R. Stubblefield, Nashville. Discussion to be opened by Dr. H. A. Smith, Cincinnati, Dr. T. B. Hartzell, Minneapolis, Dr. A. H. Peck, Chicago, Dr. O. L. Hertig, Pittsburg.
4. Orthodontia Technology. Two papers. Dr. S. H. Guilford, Philadelphia, Dr. C. S. Case, Chicago. Discussion to be opened by Dr. W. E. Grant, Louisville, Dr. A. E. Webster, Toronto, Dr. H. A. Pullen, Buffalo, Dr. H. T. Smith, Cincinnati.
5. The Value of Instruction in Dental History and Literature. Paper by Dr. J. Taft, Ann Arbor. Discussion to be opened by Dr. H. L. Ambler, Cleveland, Dr. Charles McManus, Hartford, Conn., Dr. J. H. Kennerly, St. Louis, Dr. B. J. Cigrand, Chicago.
6. Porcelain Technology. Paper by Dr. H. J. Goslee, Chicago. Discussion to be opened by Dr. J. Q. Byram, Indianapolis, Dr. Ambler Tees, Philadelphia, Dr. L. E. Custer, Dayton, Dr. H. L. Banzhaf, Milwaukee, Dr. J. F. Ross, Toronto.
7. The Dental Curriculum. Paper by Dr. Geo. E. Hunt, Indianapolis. Discussion to be opened by Dr. G. V. Black, Chicago, Dr. J. B. Wilmott, Toronto.

8. How Shall Quizzes Be Conducted? Symposium by Dr. F. D. Weisse, New York, Dr. R. H. Nones, Philadelphia, Dr. L. P. Bethel, Columbus.
9. Exhibition of Recent Teaching Appliances. Dr. W. G. Foster, Baltimore, Dr. L. S. Tenney, Chicago.

W. H. WHITSLAR, Chairman Ex. Com.

RESOLUTIONS ON DEATH OF DR. TAFT BY FACULTY OF DENTAL DEPARTMENT, UNIVERSITY OF MICHIGAN.

Whereas, by the death of our honored and esteemed colleague and leader Dr. Jonathan Taft, the faculty of the College of Dental Surgery of the University of Michigan feels that it has been sorely bereaved in a personal as well as an official manner. Personally, because of his courteous and cheerful conduct in our official and social relations. His attitude toward us has ever been of the most kind and considerate nature and will remain with us a precious memory. Officially, we shall miss his wise and experienced counsel and his deep interest in and devotion to our work. He was ever ready to make needed sacrifice of time and talent for his beloved profession, and especially for the school of dental education to which he gave so many years of valuable service. He labored to make this a leading school for training men to the highest ideals of professional culture, that through its alumni professional standards might be upheld and public service of the highest grade secured. His personal efforts have ceased forever, but his spirit remains to complete the work he designed.

Resolved, that we mourn the loss of our beloved colleague, and by official action record on our minutes this expression of our esteem and honor for one who has labored so patiently and faithfully to accomplish that which appears to us most honorable and meritorious.

To his bereaved family we extend our cordial sympathy and pray for the consolation of Him who giveth and also taketh away.

Unanimously adopted by Faculty action Oct. 23, 1903.

News Summary.

E. L. CLARK, 81 years old, a dentist of Dubuque, Ia., died Oct. 6, 1903.

C. W. CASE, 65 years old, a dentist at Cardington, O., died Sept. 18, 1903.

C. CARTWRIGHT, 72 years old, a dentist at Logan, Utah, died Oct. 10, 1903.

P. FULLER, 67 years old, a dentist at Chagrin Falls, O., died Sept. 22, 1903.

C. E. MENSCH, one of the oldest dentists in Brooklyn, died Oct. 6, 1903.

C. L. CHANDLER, 76 years old, a dentist of Syracuse, N. Y., died Oct. 11, 1903.

C. M. GILL, 68 years old, a dentist at Baltimore, Md., died Oct. 4, 1903, from cancer.

GEORGE JESSON, a dentist at St. Charles, Minn., was killed in a cyclone Oct. 2, 1903.

C. F. LITTLE, a dentist at Kewanee, Ill., was instantly killed by a train Oct. 5, 1903.

W. E. NAUMAN, 24 years old, a dentist of New Windsor, Colo., died Oct. 8, 1903.

T. S. LINTHICUM, for 40 years in the practice of dentistry in Baltimore, died Oct. 21, 1903.

A. W. SHAW, 60 years old, a dentist at Grafton, W. Va., died Oct. 20, 1903, from dropsy.

F. S. MANNING, 47 years old, a dentist at Versailles, Mo., died Oct. 6, 1903, from consumption.

W. H. RUSSELL, 33 years old, a dentist at Providence, R. I., died Sept. 18, 1903, after a long illness.

BANKRUPT.—C. N. Folse, a dentist at Whitecastle, La., filed a petition in bankruptcy Sept. 28, 1903.

C. H. KEACH, 50 years old, a dentist at Somerville, Mass., died Sept. 16, 1903, after a short illness.

F. H. DIMMICK, 30 years old, a dentist at Oakland, Cal., died from accidental poisoning Sept. 18, 1903.

E. J. SCANLON, 33 years old, a dentist of Washington, D. C., died suddenly, Oct. 11, 1903, from heart failure.

A. S. DENNISON, 58 years old, and formerly a dentist at Watertown, N. Y., died Oct. 1, 1903, from paralysis.

ASA A. HOWLAND, for thirty-three years in the practice of dentistry at Worcester, Mass., died Oct. 21, 1903.

EDWARD WINGREN, 29 years old, a dentist of Chicago, died at Phoenix, Ariz., Oct. 17, 1903, from consumption.

H. W. SPICER, 26 years old, a dentist at Pueblo, Colo., died Oct. 5, 1903, from an accidental overdose of chloroform.

A. H. JOHNSON, 31 years old, a dentist at Holden, Mo., died Sept. 23, 1903, from heart failure. He had been married only a week.

J. W. LEAHY, a dentist formerly in practice at Harrison, O., but lately in Cincinnati, died Sept. 13, 1903, from cerebral hemorrhage.

MISFORTUNES never come singly; generally they are married and have a large progeny.—*Ex.*

D. M. OLKON, a dentist in Chicago, was made defendant Oct. 15, 1903, in a police court on a charge of assault and battery preferred by his wife.

HIS DUTY.—A dentist should never look for nor expect gratitude, but for the sake of himself and his profession he should collect his bills.—*Hints.*

FOR FOUL BREATH.—A few drops of the following in a tumbler of water: Saccharin gr. xv, soda bicarb. gr. xv, acid salicylic ℥j, sp. vin. rect. ℥vjss. Misce.—*Ex.*

REMOVING ROOT-CANAL FILLING.—H. L. WHIPPLE, in *Review.* I have successfully opened up a canal after it had been filled with gutta-percha, having

failed with the various methods, by sealing chloroform in the chamber for a day.

A. T. WEBB, formerly a practising dentist in Chicago, but a resident for the last eighteen years of Italy, and the dentist to King Victor Emmanuel, was a Chicago visitor this month.

L. R. HAWLEY, a dentist formerly in practice at Rantoul, Ill., and who had served with the hospital corps in the Philippines, shot and fatally wounded his wife, Oct. 14, 1903, in Chicago.

DENTAL CYST IN HORSE.—According to newspaper report, a veterinary surgeon in Nebraska recently operated upon a growth at the base of a horse's ear, and discovered it to be a cyst containing two large teeth.

REDUCING THE STRENGTH OF AN ACID.—In reducing the strength of an acid by water the acid should be poured into the water, not the water into the acid, and the mixture should be stirred during the pouring.—*Ex.*

CLEVELAND (N. C.) DENTAL SOCIETY held its annual meeting at Shelby, N. C., Sept. 25, 1903, and elected the following officers: Pres., R. E. Ware, Shelby; V.-P., A. B. Holland, Caroleen; Secy., J. R. Osborne, Shelby.

LINCOLN ODONTOGRAPHIC SOCIETY was organized at Lincoln, Neb., Sept. 23, 1903, and the following officers were elected: Pres., H. A. Shannon, Lincoln; V.-P., H. F. Helms, Lincoln; Secy. and Treas., N. E. Vance.

ODONTOGRAPHICS held their annual meeting at Kansas City, Sept. 19, 1903, and elected the following officers: Pres., G. A. Esterly, Lawrence, Kan.; V.-P., C. H. Darby, St. Joseph, Mo.; Secy. and Treas., J. P. Root, Kansas City, Mo.

INDISPENSABLE.—I cannot get along without the DIGEST. I take four other journals, but think more of it than any of them. J. H. Sloan, Santa Paula, Cal.—I am very much pleased with the DIGEST. G. A. Potter, Cape Vincent, N. Y.

IRRIGATION OF WOUNDS OR LARGE CAVITIES.—To irrigate wounds or large cavities it is always best to employ solutions at or slightly above the temperature of the body, as cold appears to interfere with the reparative action of injured tissues.—*Internat. Jour. of Surg.*

SOUTHWESTERN IOWA DENTAL SOCIETY held its annual meeting at Albia, Oct. 15-16, 1903, and the following officers were elected: Pres., J. I. Tomy, Mt. Ayr; V.-P., M. F. Stever, Creston; Secy., J. A. West, Creston; Treas., G. E. King, Villisca. The next meeting will be held at Osceola.

ALCOHOL.—Valentino (*Revue de Méd.*) has shown that the toxic effects of alcohol are due in part to its dehydrating power, as previously asserted by Dubois. The staggering gait is found to be due to the toxic power of alcohol proper; the coma is due to the absorption of water from the nerve tissues.

MCLEAN COUNTY (ILL.) DENTAL SOCIETY held its annual meeting at Bloomington, Oct. 23, 1903, and elected the following officers: Pres., G. D. Sitherwood, Bloomington; V.-P., J. W. Kasbeer, Normal; Secy., B. M. Vandervoort, Bloomington; Treas., J. B. Brown, Bloomington; Ex. Com., J. S.

Reece, Bloomington; R. D. Garrett, Bloomington; H. C. Rodenhauser, Bloomington.

INFORMATION WANTED.—"If an insect in the ear refuses to budge, a little cigar smoke will soon turn him into a lifeless body. If you don't smoke, then use oil or water."—*Surgical Clinic.*—Will the editor of our esteemed contemporary kindly tell us how a man is supposed to blow cigar smoke into his own ear?

HARTFORD (CONN.) DENTAL SOCIETY held its annual meeting Oct. 12, 1903, and elected the following officers: Pres., Edward Eberle; V.-P., A. W. Cowee; Secy., A. E. Carey; Treas., E. R. Whitford; Ex. Com., C. E. Barrett, Chairman, F. B. Clark, C. C. Prentiss; Librarian, W. A. Damon; Historian, N. J. Goodwin.

SOUTHERN CALIFORNIA DENTAL ASSOCIATION held its sixth annual meeting at Los Angeles, Sept. 28-29, 1903, and elected the following officers: Pres., L. E. Ford, Los Angeles; 1st V.-P., Emma T. Reed, San Diego; 2d V.-P., C. R. Reynolds, Santa Ana; Secy., C. N. Benbrook, Los Angeles; Treas., W. H. Spinks, Los Angeles.

OBLIGATIONS OF OPERATOR TO PATIENT.—Progress in dentistry tends to further advances along lines other than those of manipulative ability, and necessarily calls for a keener appreciation of the obligations of operator to patient than we see ordinarily displayed when this profession is practiced as a mechanical art.—F. W. KNOWLTON, *Summary.*

ANATOMY AND HISTOLOGY OF THE MOUTH AND TEETH.—By I. Norman Broomell, D. D. S., Professor of Dental Anatomy, Dental Histology, and Prosthetic Technics in the Pennsylvania College of Dental Surgery. Second edition, revised and enlarged, with 337 illustrations. Pages, 510. Price, $4.50 net. Published by P. Blakiston's Son and Co., Philadelphia.

FAMILY TOOTHBRUSH.—An erratic genius has patented a water motor which can be attached to the faucet in any bath room. A rubber tubing leads from the motor, and on the end of it is a rotary toothbrush which will revolve and be kept wet when the water is turned on. The brushes are interchangeable, so that each member of the family may have his own.

SHOWING 'EM OFF.

There was a girl in our town
Who with a dentist time beguiled,
And after that I noticed she
Just smiled, and smiled, and smiled!—*Augusta Herald.*

TOOTHACHE DROPS POWERFUL.—A woman in Chicago bought some "toothache drops" at a drug store to stop a toothache. The directions said, "Rub it on your face and the pain will disappear in an instant." The directions were followed and the pain did disappear, but the flesh on that side of her face went with it. Hereafter she says she will seek a dentist when her teeth ache.

SOUTHERN ILLINOIS DENTAL SOCIETY held its eleventh annual meeting at East St. Louis, Oct. 13-14, 1903, and elected the following officers: Pres.,

J. K. Conroy, Belleville; V.-P., W. G. Carney, East St. Louis; Secy., H. K. Barnett, Upper Alton; Ex. Com., E. L. Burroughs, Edwardsville; L. K. Kraft, Collinsville; G. W. Entsminger, Carbondale. The next meeting will be held at Belleville in October, 1904.

QUESTIONS AND ANSWERS.—Embracing the Curriculum of the Dental Student, divided into Three Parts. By Ferdinand J. S. Gorgas, A. M., M. D., D. D. S., Author of "Dental Medicine," etc., Professor of the Principles of Dental Science, Oral Surgery, etc., in the University of Maryland, Dental Department, Baltimore. Published by P. Blakiston's Son & Co., Philadelphia. Octavo, 540 pages. Price, cloth, $6.00 net.

FIRES.—H. W. Allwine, Omaha, Oct. 14, loss $100.—R. S. Cole, Charlotte, N. C., Oct. 20, total loss.—G. Kellogg, Madison, O., Sept. 30, total loss.—New York Dental Co., Omaha, Oct. 14, loss $50.—J. E. Stage, Goshen, Ind., Oct. 3, loss $150, fully insured.—Union Dental College, Omaha, Oct. 14, loss $100.—E. Wade, Magee, Miss., Sept. 22, loss $500, no insurance.—Wyeth Dental Parlors, Boston, Oct. 19, loss $100.

NORTHERN ILLINOIS DENTAL SOCIETY held its sixteenth annual meeting at Freeport, Oct. 21-22, 1903, and elected the following officers: Pres., A. H. McCandless, Rock Island; V.-P., C. J. Underwood, Elgin; Secy., A. M. Harrison, Rockford; Treas., M. R. Harned, Rockford; Chairman Ex. Com., C. L. Snyder, Freeport; Supervisor of Clinics, C. B. Helm, Rockford. The next annual meeting will be held at Sterling the third week in October, 1904.

WATER OF PAGLIARI.—This is a preparation much employed in France as a hemostatic in hemorrhages accessible from without, as in the skin, the mucous membrane, nose, mouth, etc. Professor Gilbert (*Journ. de Méd. Interne.—N. Y. Med. Jour.*) gives the formula as follows: Crystallized alum, 10 gm. (150 gr.); gum benzoin, 5 gm. (75 gr.); distilled water, 100 gm. (3 oz.) M.

LONG'S DENTAL MATERIA MEDICA AND THERAPEUTICS.—A Text-Book of Dental Materia Medica and Therapeutics for Students and Practitioners of Dentistry. By Eli H. Long, M. D., Professor of Materia Medica and Therapeutics in the Medical and Dental Departments of the University of Buffalo, N. Y. In one octavo volume of 321 pages, with 24 illustrations, including 18 full-page colored plates. Cloth, $3.00, net. Lea Brothers & Co., Philadelphia and New York.

HER DEGREE OF COURAGE.—The little girl had been suffering several days with toothache, and at last consented to go with her papa to the dentist. When she was starting, her mama said: "Now, dearest, be a brave little girl. Show fortitude and mama will be proud of you." In due time she returned, and mama inquired: "And did you show fortitude?" The little one hesitated—"It hurted awful, mama; I guess I showed (reflectively) about twentitude."

PATENTED TOOTHACHE REMEDY.—There has been patented in Sweden (*Record*) the following medicament for curing toothache: A mixture of thirty parts by weight of candy, twenty parts by weight of white pepper, fifteen parts by weight of common salt, and five parts by weight of peppermint oil.

These ingredients are boiled together, and the product formed into pellets, one of which is to be pressed into the aching tooth." This exhilarating compound pressed into an exposed pulp will probably lead to a radical cure by the nearest dentist.

PRESERVING MODELS FOR CROWN WORK FOR FUTURE REFERENCE.—Grafton Munroe, in *Review*. In making a Richmond or porcelain base of platinum the pin and base should be prepared with wax to facilitate removal from the model. As soon as the pin and base are completed and impression taken, place a film of wax over the exposed surface just before pouring the model. After the model has hardened, remove pin and base by grasping the pin with hot, square-nose pliers, thus melting the wax by imparted heat. The model is thus preserved for future reference.

ALAS! ALAS!! ALAS!!!—The people of Marion, Ind., are just waking up to the fact that the "painless dentists" who arrived some months ago and advertised that they "were here to stay," were there to stay only long enough to fleece the suckers. Same old methods—misrepresentation, lying advertisements, exorbitant charges, rotten work, etc. Same results—mutilated mouths, lighter pocketbooks, sadder but not wiser populace. They will bite just as hard when the next fakirs come along. Meanwhile, however, the reputable practitioners of the town will be kept busy repairing the damage.

TO CURE BALDNESS.—"To the Editor, I am a young married man, and a constant reader of your high-class journal. Will you kindly advise me what is good for a bald head, and oblige, anxiously yours, *Reginald*."

"The best thing we know of, Reginald, is a divorce, but if you haven't got the price you might try the formula we bought of a gypsy lady, with instructions not to open it till we got home. Here it is: Take a handful of needles and puncture your head all over, turning the ends of what hair you have into the holes thus made. Then cut the loops. This will double the quantity."—*Ex.*

FATALITIES.—Oct. 1, a man in San Francisco died in a dentist's chair while under the influence of chloroform. A physician administered the anesthetic, and stated at the inquest that he had given chloroform to the man a short time before with no bad effects.—Sept. 24, a woman in Brooklyn went to the dentist and had several teeth extracted. She had suffered from bronchitis for several years, and the shock of the operation, together with the loss of blood, caused her death four days later. Her physician had warned her against having any dental work done in her weak physical condition, but she had the teeth extracted without his knowledge.

HARDENING PLASTER CASTS.—It is claimed that the following process, if strictly carried out, will harden plaster-of-Paris forms, making them susceptible to a very high polish: Take one part alum free from iron, dissolve in five and one-half parts hot water, immerse the plaster form in this solution, and allow it to remain therein from one-half hour to several weeks, depending upon the size and bulk of the form under treatment. After it has absorbed a sufficient quantity of the solution, remove the form and from

time to time drench it with the same solution until a coating of crystallized alum is formed over its entire surface; when thoroughly dry polish with fine sandpaper and finish by rubbing with a damp cloth. The product will be a hard, dense mass of fine texture, extremely white, showing a high polish and resembling Carrara marble.—*Ex.*

INDIANA REPORTERS IMAGINATIVE.—Indiana has always been noted for tall snake stories, and the newspaper reporters now seem to have turned their attention to dentistry. The reports for this month are that there is a woman in Peru, Ind., who has terrible attacks of indigestion, nervousness, etc., and who relieves same instantly by pulling out a tooth. Three have gone thus far. Let us hope that the supply will hold out or that the attacks will cease. It is further reported that a dentist at Kokomo, Ind., extracted a full upper and lower set of well-developed teeth from the mouth of a new-born babe in that town. It is stated that the child will probably recover, but, alas, his teeth are gone forever.

UNBORN CHILD HEIR WITH OTHER CHILDREN.—An unusual point of law, the first of its kind ever raised in Canada, and it is stated (*Jour. A. M. A.*) the second on record, has recently been pronounced on and decided at Toronto by Mr. Justice Lount. A farmer in the western part of Ontario died, leaving a widow and four children. A fifth child was born four months afterward. The case turned on the division of a $2,000 insurance policy, which, according to the will, was to be turned over to the widow and children in equal shares. The administrators applied to the court for advice as to whether or not the infant child born after the death of her father was entitled to a share in the insurance money. His lordship ruled that a child, although unborn, is still a child in law, and takes rank as a child living at the death of its parent.

SUCH IS FAME!—"Die häufigste und dabei nicht am wenigsten gefürchtete aller Operationem das Zahnziehen, scheint einem neuen Fortschritt entgegenzugehen. Seitdem der Engländer Horace Wells in Jahre 1844 zum ersten Mal zur Linderung des Schmerzes beim Zahnziehen Aether anwandte, sind unzählige Mittel zu dem gleichen Zweck versucht worden."

The above paragraph is from an article entitled "Schmerz- und blutloses Zahnziehen" in the *Archiv. fur Zahnheilkunde*, and translated into English is as follows: "The most frequent and not the least feared of all operations—the extraction of teeth—seems to be on the verge of an improvement. Since the Englishman, Horace Wells, used ether for the first time in 1844 for the relief of pain incident to the extraction of teeth, a considerable number of agents have been tried for this purpose."—*Cosmos.*

ROBBERIES.—W. E. Hutchason, Los Angeles, Cal., Sept. 18, $300.—C. B. Rohland, Alton, Ill., Oct. 7, $100.—S. O. Budd, Muncie, Ind., Oct. 4, $25.—O. J. Eagan, Fall River, Mass., Sept. 20, $30.—F. O. Kidd, Fall River, Mass., Sept. 22, $40.—S. P. Russell, North Hudson, N. J., Oct. 14, $100.—Harold Parker, Brooklyn, Oct. 19, $250.—L. F. Glazier, Springville, N. Y., Sept. 20, $50.—A. S. Condit, Mount Vernon, O., Oct. 18, $100.—G. W. DeCamp, Mansfield, O., Oct. 3, $100.—J. H. Sloan, J. M. Little, R. Calcott, C. J. Harrison,

East Liverpool, O., Oct. 4, $500.—George H. Jackson, Butler, Pa., Oct. 10, $75.—A. B. Troth, Homestead, Pa., Oct. 1, $10.—Frank D. Geer, Johnstown, Pa., Oct. 9, $70.—H. C. Hinchman, Johnstown, Pa., Oct. 9, $25.—Sept. 22, thieves at Providence, R. I., made an unsuccessful attempt to rob some dental offices.—M. L. Rudolph, Clarksville, Tenn., Oct. 13, $200.

ACCIDENTS.—Recently a woman at Shelbyville, Ind., had a tooth extracted, and as the jaw is gradually closing, her physicians fear lockjaw.—This month a young dentist at Goldsboro, N. C., was experimenting with a nitrous oxid outfit and almost asphyxiated himself.—Oct. 18, a banker at Omaha swallowed a cleft palate obturator, which he had worn for several years, and laryngotomy was necessary to recover it.—Oct. 10, a vulcanizer blew up in the office of a dentist at Milwaukee and did about $200 worth of damage.—Oct. 15, a vulcanizer exploded in the office of a dentist at Greensburg, Ind., and tore things "wide open."—A young dentist at New Britain, Conn., did not notice that the flame in his Bunsen burner had been blown out by a gust of wind and that the gas was escaping. A man in an adjoining office noticed the odor of gas and rescued the young man when he was almost asphyxiated.

BACKING UP TEETH.—Use 22 karat, 30 gauge gold. Anneal gold and fit backing to tooth and burnish the piece upon tooth surface, file to proper length and width, then cut piece of same material as backing, width about one-half that of the space from pinholes to incisal edge. Use sufficient borax to form a flux upon backing. Place piece across backing flush with cutting edge. Lay small piece of 22 karat solder on backing close to reenforcing piece, place in flame of Bunsen burner and fuse the solder. You now have a backing reenforced, which place on tooth, bending pins so as to fasten, and invest for soldering, using 18 karat solder. We have here a backing sufficiently strong to withstand masticating force, with perfect adaptation to the surface of the tooth, and which when finished is flush with cutting edge of tooth. It will protect the porcelain from being crushed by the usual force exerted in biting off hard pieces of food.—I. A. Freeman.

DAMAGE SUITS.—A woman in Chicago has sued a dental college for $5,000 damages, claiming that six years ago a student left the broken end of an instrument in one of her teeth and that it has given her trouble ever since.—A man in St. Louis is suing a dentist for $2,500 damages, alleging that a student in the dentist's office broke his jaw while extracting a tooth.—A woman in Spokane, Wash., recently sued a dental parlor for $1,000 damages, claiming that the set of teeth which was made for her did not fit and that her mouth was injured in consequence, but she lost the suit.—Another woman in Spokane recently sued the proprietors of a dental parlor for $500 damages, alleging that blood-poisoning was caused by dirty instruments and unskillful work in extracting some teeth, but she also lost the suit.—A Chicago woman has sued Victor C. Bell, a dentist of New York City, for $25,000 damages for breach of promise.—A man in Omaha recently brought suit against the proprietors of a notorious dental parlor, claiming that he was assaulted when he asked them to make over some bad work which they had done for him. Two of the operators were fined each $10 and costs.—A woman in Chicago

has brought suit against the proprietor of a "painless dental college," alleging that when she went to him to have a tooth treated he took gold fillings out of her teeth which other dentists had put there, and then wanted to make an exorbitant charge for putting them back.—On the complaint of a woman that her jaw had been broken by a student in their employ while extracting a tooth, the proprietors of a dental parlor in Philadelphia were recently convicted of practising dentistry without a license and of having unlicensed students working for them. The woman then brought suit against them for $20,000 damages, and the court allowed her $4,000.

ILLEGAL PRACTITIONERS.—A man in San Francisco has begun suit against the state board of dental examiners to compel them to issue to him a certificate. The board refused to examine him because his certificate was from an unrecognized college. The California Board has arrested several dentists in Oakland, claiming violation of the state law, and they, on the other hand, state that they are fully complying with the law and that they will bring damage suits against the board.—Recently the proprietor of a "painless dental college" of Omaha was fined for practising dentistry without a license, the state board of health having previously revoked his license for unprofessional and questionable conduct. He took the matter to the district court, which has upheld the action of the board.—A man in Columbia, S. C., has been arrested for practising dentistry without a license.—A man in Hendersonville, S. C., has sued the state board for $5,000 damages and applied for a writ of mandamus to force the board to give him a license. He failed to pass the recent examination.—The Washington Board has arrested seven dentists in Seattle, most of them proprietors of dental parlors, either for practising dentistry without a license or for having unlicensed operators in their employ. —Last month a man at Superior, Wis., was arrested for practising without a license.

EXAMINING BOARD AFFAIRS.—At the October meeting of the Idaho State Dental Board fifteen applicants passed the examination.—At the October meeting of the Michigan Board ten candidates were successful.—At the last meeting of the Minnesota Board only eight out of twenty-five applicants passed the examination.—At the October meeting of the Missouri Board R. M. Burgess of Paris was elected President, and S. C. A. Rubey of Clinton, Secretary.—Dr. F. C. Barlow of Jersey City has resigned from the New Jersey Board, and the governor has appointed Dr. A. Irwin of Camden to succeed him.—The New York Board has elected the following officers: Pres., A. M. Holmes, Morrisville; Secy., Frank French, Rochester; Editor, Wm. Carr, New York.—At the October meeting of the Pennsylvania Board Dr. H. DePuy was reelected president. The Board issued a ruling to the effect that hereafter New York State dental licenses would be accepted for registration in Pennsylvania without examination, and stated that Pennsylvania licenses would be accepted in New York on the same terms.—Oct. 17, the Governor of Tennessee appointed Dr. Southall Dickson of Bolivar a member of the State Board to succeed Dr. J. L. Mewborn.—Oct. 2, the Governor of Texas made the following appointments on the State Board:

C. C. Weaver of Hillsboro, M. S. Merchant of Giddings, and T. L. Westerfield of Dallas.

PALATAL PARALYSIS.—By Dr. S. Erben, Vienna. (*Jour. Brit. Dent. Assn.*) The author remarks that this case of palatal paralysis will best illustrate the care necessary for the diagnosis of paralysis in the neighborhood of the buccal cavity. The patient, a man aged twenty-seven, enjoyed perfect health until three weeks previous to the time of observation, when he was attacked with fever and general prostration. Ten days later he had so far recovered that he could return to work, but about a fortnight afterward observed that he could not swallow as well as usual, every effort being followed by regurgitation through the nose or by a flowing back into the mouth. There was no hoarseness or cough, and the tongue and lips were intact, while speech was perfect. The mucous membrane of the throat and mouth was pale, and no inflammation could be observed anywhere, while the tonsils were barely visible. Nowhere was there any white deposit, and no adenoid growth could be observed in the posterior surface of the fauces, but the uvula was asymmetric, and the palato-glossal and palato-pharyngeal arches were distinctly deviated toward the left side, while only the anterior arch could be seen on the right side, as the former quite covered the latter. From this asymmetry, unilateral paralysis of the palate was diagnosed, and after three weeks' treatment deglutition could be performed freely, the different structures having regained their normal condition.

THOROUGHLY STERILIZED.—"This towel," said the attendant in the germ-proof barber shop, "has been subjected to an extreme heat and is thoroughly sterilized. We take every precaution against exposing our patrons to infection or contagion."

"Good thing," commented the patron.

"This soap," went on the attendant, picking up the cake thereof, "has been debacterialized, and the comb and brush are thoroughly antisepticized."

"Great scheme," said the patron.

"The chair in which you sit is given a daily bath in bichlorid of mercury, while its cushions are baked in an oven heated to 987 degrees, which is guaranteed to shrivel up any bacillus that happens along."

"Hot stuff," said the patron.

"The razor and lather brush are boiled before being used, and the lather cup is dryheated until there is not the slightest possibility of any germs being concealed in it."

"Fine," said the patron.

"The hot water with which the lather is mixed is always double-heated and sprayed with a germicide, besides being filtered and distilled. It is as pure as it can be made."

"Excellent," said the patron.

"Even the floor and the ceiling and the walls and the furniture are given antiseptic treatment every day, and all change handed out to our customers is first wiped with antiseptic gauze."

"Well, look here," said the patron, who had been sitting wrapped in the

towel during all this, "why don't you go ahead and shave me? Think I'm loaded with some kind of a germ that you have to talk to death?"

"No, sir," answered the attendant. "But I am not the barber."

"You're not? Where is he?"

"They are boiling him, sir."—*Tit-Bits.*

MARRIAGES.—J. A. Brown, a dentist of Champaign, Ill., was married to Miss Mary H. Kittridge of Cleveland, Oct. 7.—George M. Budlong, a dentist of West Winfield, N. Y., was married to Miss Jean Craig of Camden, N. Y., Oct. 21.—S. I. Callahan, a dentist of Woodstown, N. J., was married to Miss Gertrude W. Bassett of Woodstown, Oct. 15.—G. D. Creagin, a dentist of Ware, Mass., was married to Miss Anna Clarke of New London, Conn., Oct. 1.—John J. Clemmer, a dentist of Marshalltown, Ia., was married to Miss Maude M. Rathert of Cresco, Ia., Sept. 29.—C. M. Corrington, a dentist of Omaha, was married to Miss Bertha B. Brillhart of Tecumseh, Neb., Sept. 30.—W. O. Dunning, a dentist of Middletown, N. Y., was married to Miss Clara M. Beakes of Newburgh, N. Y., Oct. 7.—Carlton M. Evans, a dentist of New Carlisle, O., was married to Miss Mary V. Crain of Springfield, O., Oct. 21.—Edwin Fulton, a dentist of Wichita, Kan., was married to Stella Fisher of Granville, Ill., Oct. 7.—C. F. Glenn, a dentist of Asheville, N. C., was married to Miss Maggie Johnston of Avery's Creek, N. C., Sept. 27.—George T. Greenwood, a dentist of Fitchburg, Mass., was married to Miss Anna S. Spooner of Hinsdale, Mass., Oct. 1.—Clarence Kemper, a dentist of Covington, Ky., was married to Miss Letha Callahan of Verona, Ky., Sept. 10.—E. E. Lane, a dentist of Aberdeen, Wash., was married to Miss Catherine A. Graham of Aberdeen, Oct. 7.—Estelle Lewis, a dentist of Cripple Creek, Colo., was married to Wm. Arkins of Cripple Creek, Oct. 7.—Frank S. Martin, a dentist of Muncie, Ind., was married to Miss Patton Letton of Richmond, Ky., Oct. 20.—H. H. McCullough, a dentist of Stanberry, Mo., was married to Miss Bessie T. Miller of Salt Lake City, Sept. 22.—C. F. Mills, a dentist of Alaska, was married to Miss Minnie E. Twombly of Alaska, Aug. 21.—W. E. Munger, a dentist of Piqua, O., was married to Miss Clara Slicer of Troy, O., Sept. 29.—W. A. McFarlane, a dentist of Waukesha, Wis., was married to Miss Elsie Kingston of Muskego, Wis., Oct. 14.—S. S. Millet, a dentist of Kansas City, was married to Miss Jane B. McKeown of Kansas City, Oct. 16.—Thomas F. O'Shea, a dentist of Leroy, N. Y., was married to Miss Mary Louise Growney of Leroy, Oct. 6.—Marezo Ozaki, a Japanese dentist of Philadelphia, was married to Miss Elizabeth Dawson of England, Sept. 24.—R. J. Rinehart, a dentist of Canton, Ill., was married to Miss Myrtle Harmison of Canton, Sept. 24.—E. R. Stedman, a dentist of East St. Louis, Ill., was married to Miss Estella MacCreedy of East St. Louis, Oct. 22.—H. S. Shields, a dentist of Brownstown, Ind., was married to Miss Ova Brown of Houston, Ind., Oct. 7.—C. M. Snyder, a dentist of Waterloo, Ia., was married Sept. 30.—W. H. Taylor, a dentist of Dayton, O., was married to Miss Sadie Steele of Covington, Ky., Sept. 20.—Otto M. Wisehart, a dentist of Middletown, Ind., was married to Miss Bertha M. Dilworth of Des Moines, Ia., Oct. 28.

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